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Initialled abstracts and reviews not by Bureau staff are by G. H. Freeman, A. C. Mason and M. C. Vyvyan of the East Malling Research Station, F. W. Beech of Long Ashton Research Station, the staff of the Obstbauversuchsring, Jork, Germany [O.J.], G. St.C. Feilden and J. Schofield.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

3693. FAO.

The organization of agricultural research in Europe.

FAO Develop. Pap. Agric. 29, pp. 66, 2s. 6d.

The information contained in this paper "is based on a survey of the organization of agricultural research in European countries and on a discussion of problems of research organization in which most of the European member countries of FAO participated" and "should be of interest to less developed countries in which efforts are being made to establish and improve research programs and organizations to administer that research; and also to the more highly developed countries which may be considering ways of modifying existing organizations to some degree to increase the efficiency of their research programs."

3694. AGRICULTURAL RESEARCH COUNCIL.

The agricultural research service [in the U.K.].

H.M.S.O., London, 1953, pp. 54, 2s. 6d.

The term Agricultural Research Service is a convenient way of referring to the 30 to 40 agricultural research institutes and units in England, Wales and Scotland which are state financed and are supervised by the Agricultural Research Council. This booklet indicates where particular research is being done and by whom, and presents an account of the co-ordinating functions

of the council. The A.R.C. as such is a body of 15 members chosen for their knowledge of agriculture or science. Members retire after 5 years' service so that the body is constantly renewed. The A.R.C. has set up 3 Standing Committees to help it with regard to research in animals, plants and soils, and agricultural engineering respectively. These Standing Committees get further help by appointing Technical Committees or Conferences, not restricted to their own membership, to keep in touch with particular phases of agricultural development. These various committees and their contemporary members are listed. The work of the council is discussed here under the following headings: Supervision of state-aided institutes; Administration of its own institutes and units; Special research grants for fundamental and applied research, mainly at the Universities; Training grants and research studentships—made to recruits for the service; and Liaison with Agricultural Departments. A chart shows which bodies come under direct control of the A.R.C. and which receive advice on research programmes, staff and budgets. A concise note on the Commonwealth Agricultural Bureaux states that they serve primarily the needs of all departments of research institutes in the countries of the British Commonwealth. This is a most useful skeleton guide.

3695. SOANE, G., AND ROUND, R. C.

The royal gardens at Windsor.

Agriculture, Lond., 1953, 60: 105-8, illus.

The 30 acres comprising the gardens at Windsor Castle are intensively cropped with fruit, flowers and vegetables to serve the royal establishments and the commercial market. From a description of the layout the following points may be briefly mentioned: (1) A succession of glasshouse peaches is provided for from May until November, the main varieties being Duke of York, Peregrine and Golden Eagle. (2) Among the raspberry varieties grown, Malling Promise and St. Walfried have given the best results. (3) Carnations have been grown in sand for the past 10 years, using a dry-feed method.

3696. WALLACE, T., AND BARKER, B. T. P.
Long Ashton Research Station: its origin and development, 1903-53.
Science and Fruit, 1953, pp. 11-27, bibl. 9, illus.

The origin of Long Ashton lies in a scheme for cider-making experiments started in 1893 by R. Neville Grenville at Butleigh Court, near Glastonbury. Ten years later a report on the trials was submitted to the Board of Agriculture. The Board, agreeing with the findings of a conference at Bristol in 1902 that an Institute should be established, calculated that it would need an income of £1,100 a year and agreed to an annual contribution towards it. Most of the sum mentioned was guaranteed by the Board of Agriculture, the Bath and West Society and the County Councils of Devon, Gloucester, Hereford, Somerset, Worcester and Monmouth. Among the objects of the Institute laid down were: (1) the determination of the best methods of cultivating all kinds of fruit and vegetables, (2) investigation of the best methods of utilizing these products with special reference to the production of cider, perry, etc., (3) improvement of fruit and vegetable varieties, and (4) dissemination of results. How the original scheme came into being, how it developed through two war periods and how buildings have tried vainly to keep pace is told in a fascinating manner in the pages that follow. Outstanding achievements in particular fields are briefly noted with regard to cider and fruit products, pomology, plant nutrition, control of pests and diseases and domestic preservation of fruits and vegetables.

3697. NORTH OF SCOTLAND AGRICULTURAL COLLEGE.
Guide to experiments and demonstrations on Craibstone Farm; Grassland Experimental Centre, Muchalls; Balnastraid Farm, Dinnet; Aldroughy Farm, Elgin; Glensauch Farm, Fettercairn; and other centres.
[Publ.] N. Scot. agric. Coll., 1953, pp. 72, illus.

The Horticultural Department on the Craibstone Estate raises tomatoes, chrysanthemums and other crops under glass, and vegetables, soft fruit, apples and pears.

3698. CHEESMAN, E. E.
A new agricultural research institute.
Nature, 1953, 172: 140.

Glasshouse crops, mushrooms and outdoor flowers and shrubs will be the material under investigation at the new Agricultural Research Institute to be set up on 100 acres of newly acquired land at Toddington, near Littlehampton, Sussex. It will take the place of the old Experimental and Research Station for Glasshouse

Crops at Cheshunt, and will start with staff and apparatus transferred from that Station. It will have room to extend the Cheshunt programme in several directions.

3699. SETHI, R. L.
The geographical distribution of food crops in India and the measures adopted to meet the food deficit.
Bull. nat. geogr. Soc. India 17, 1952, pp. 19, Rs. 2 or 3s.

The author divides India into 5 main agricultural regions. Of these the Himalayan region comprising Kashmir, Kulu, Himachal Pradesh, Nainital, Sikkim, Bhutan, Darjeeling and other parts, is the fruit and drug plant region. The Coastal region on the two sides of the Peninsula, comprising the mountainous region of both Eastern and Western Ghats, is noted for the cultivation of such plantation crops as cloves, pepper, areca nut, coconuts, rubber and coffee.

3700. GRÉEN, S.
Kräver tidsläget förändrade driftsformer för svensk trädgårdsodling? (Necessary adjustments in horticultural production methods in Sweden. [English summary] 3 p.)
J. roy. Swedish Acad. Agric., 1953, 92: 131-50.

The statistical data presented show the reasons for the economic decline in Swedish horticulture, viz. over-production in conjunction with unregulated imports. Remedies are suggested.

3701. REGEL, C.
Die Erforschung pflanzlicher Rohstoffe in der Sowietunion seit Beginn des zweiten Weltkrieges. (Research on plant raw materials in the Soviet Union since the outbreak of the second world war.)
Mat. veget., 1953, 1: 189-210.

This review of the Russian literature available in Western libraries covers a wide field, including medicinal, rubber, oil, essential oil, fibre, tannin, insecticidal and ornamental plants. Sugar manufacture from lichens is among other interesting subjects discussed.

3702. SCHÜPHAN, W.
Lebensreform und Landwirtschaft in ihren Wechselbeziehungen. (The interrelation of the reform movement and agriculture.)
 Reprinted from *Gesundes Land- Gesundes Leben*, [1953?], pp. 28, bibl. 55.

The results of many experiments, some of them carried out by the author, on the effect of various manurial treatments on the nutritional value of horticultural produce are mustered to refute the theories and claims of the anthroposophical school. [See also abstract no. 3863.]

3703. STEARN, W. T.
International code of nomenclature for cultivated plants.
[Publ.] roy. hort. Soc. Lond., 1953, pp. 29, 1s. 3d.

Formulated and adopted by the International Botanical Congress Committee for the Nomenclature of Cultivated Plants and the International Committee on Horticultural Nomenclature and Registration at the 13th

International Horticultural Congress, London, September 1952. Institutions and Societies would be well advised to get copies of this code and commend it to their members for use. A German translation is under preparation under the direction of the Gartenbau-Nomenklatur-Ausschuss, Hanover.

3704. WANSCHER, J. H.

A simple way of describing flower colours, and a flower colour chart.

Yearb. roy. vet. agric. Coll. Copenhagen, 1953, pp. 91-104, 1 colour chart.

"The scope of the present paper", the author states, "is to propose a method by which the Horticultural Colour Chart* colours may be transcribed into a set of terms intelligible to readers not possessing the atlas. In order to facilitate the exact understanding of the terms of hue a small, cheap Flower Colour Chart has been made [and is given here]. It is the author's hope that the simplified colour language in combination with this chart will function as a useful link between the H.C.C. and the common reader."

* Edited by the Royal Horticultural Society in co-operation with the British Colour Council, London, 1938/40.

Statistical design.

(See also 4679, 4753.)

3705. BRADLEY, R. A.

Some statistical methods in taste testing and quality evaluation.

Biometrics, 1953, 9: 22-38, bibl. 85.

Some statistical points arising out of taste tests are considered. Four types of taste panel are distinguished: (i) for the detection of differences, (ii) for quality control; (iii) for consumer preference, (iv) for quality evaluation. Although different types of judge are required for these four, there are some general features in common with regard to the selection of panel members. Tests in which the odd one of three samples is to be identified are recommended for this purpose, and the application to them of sequential methods demonstrated. Problems arising in the design and analysis of tasting trials are also mentioned, particular reference being made to problems of scaling and scoring, ranking techniques, the method of paired comparisons and the type of experimental design. An extensive bibliography is appended. G.H.F.

3706. MASON, D. D., and KOCH, E. J.

Some problems in the design and statistical analysis of taste tests.

Biometrics, 1953, 9: 39-46, bibl. 4.

Some of the major problems in the planning and executing of taste tests are considered. The first consideration in planning is to decide what use is to be made of the results, as this determines many other features of the trial. Material should be in the same state of ripeness and, for frozen foods, temperature and texture and judging conditions should be near the optimum. Experimental designs recommended are forms of incomplete block design, as no judge should be asked to evaluate more than eight, or preferably six, samples at a time. A ten-point scoring system is recommended and preferred to ranking methods. Problems in the analysis of trials concern the validity of analysis of variance and the difficulty of determining

which observed treatment differences are real, but it is found that, in general, the usual methods can safely be used. G.H.F.

Biochemistry.

(See also 3735, 3771a, e, h, o, 3864-3867, 3891g, 4339, 4340, 4341, 4737, 4753.)

3707. WILLIAMS, A. H.

The application of chromatographic methods to the study of the biochemistry and nutrition of plants.

Science and Fruit, 1953, pp. 205-12, bibl. 6.

The great advances in the application of chromatographic methods have come about with the development of the ion-exchange resins, partition chromatography and paper chromatography. These methods have given results in recent years at Long Ashton. They have concerned the growing of cauliflower in relation to molybdenum deficiency. They have also been applied to the examination of the groups of compounds found in fruit trees known collectively as tannins or phenolics, which have, in general, resisted examination by earlier methods. Some of the results as affecting pear, apple and quince trees are touched on. They offer considerable future promise.

3708. BEESON, K. C.

Report on copper and cobalt in plants.

J. Ass. off. agric. Chem. Wash., 1953, 36: 405-11, bibl. 8.

The adoption of the nitroso-R-salt method is recommended for the determination of cobalt in plant materials, with the nitroso-cresol method as an alternative. The sodium diethyldithiocarbamate method of copper determination in plant materials is also recommended for adoption.

3709. NÖMMIK, H.

Fluorine in Swedish agricultural products, soil and drinking water.

[*Publ.*] *nat. Inst. publ. Health, Stockholm*, 1953, pp. 121, bibl. pp. 5.

Methods of F determination in biological material and F content in Swedish crops, including some horticultural plants from the Botanical Garden, Uppsala, are among the subjects discussed.

3710. PONS, W. A., JR., STANSBURY, M. F., AND HOFFPAUIR, C. L.

An analytical system for determining phosphorus compounds in plant materials.

J. Ass. off. agric. Chem. Wash., 1953, 36: 492-504, bibl. 26.

Analytical procedures for the determination of total, inorganic, acid-soluble, phosphate, and phytin phosphorus are described. Two colorimetric phosphorus methods used in the final evaluation of these different types of phosphorus compounds are given in some detail.—Southern Regional Res. Lab., New Orleans.

3711. WILLIAMS, K. T., AND POTTER, E. F.

Report on sugars in plants.

J. Ass. off. agric. Chem. Wash., 1953, 36: 401-4.

Methods of clarification of plant extracts for sugar

analysis have been studied at the Western Regional Research Laboratory, Albany.

3712. MACDOWALL, F. D. H.

Absence of acid phosphatase from chloroplasts of spinach and iris.

Plant Physiol., 1953, **28**: 317-18, bibl. 8.

An account is given of a study to determine whether or not chloroplasts contain acid phosphatase. Leaves of iris and market spinach were the materials tested. Acid phosphatase was not present in their chloroplasts.—*Dep. Bot., Univ. Michigan, Ann Arbor.*

3713. NAKAMURA, M., YAMASAKI, K., AND TODA, H.

The distribution of phosphorylase, phosphatase, and β -amylase in plants. (4) The distribution in fruits, vegetables, and leaves. *J. agric. chem. Soc. Japan*, 1951, **25: 119-21, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1953, **2** (1951/1952): 14.**

There was little or no enzyme activity in fruits in general but phosphorylase activity was great in chestnut and ginkgo. In chestnut phosphatase activity was considerable. Except for onion, the plant leaves and vegetables studied, which did not include root crops, showed some phosphorylase and phosphatase activity and little or no β -amylase activity. Pumpkin and some *Brassica* spp. were especially active in phosphorylase. It is suggested that phosphorylase may take part in the formation of assimilation starch as well as reserve starch.

3714. BOBIER, M. A., AND LEPIGRE, A. L.

Étude sur la fermentation diastasique des produits végétaux. (Research on the diastase fermentation of plant products.) *Ann. Inst. agric. Algér.*, 1952, **7** (1): 1-66, bibl. 16, illus.

An account is given of a newly developed accelerated method of controlled diastase fermentation based upon the employment of a starter and an activator. The process can be used for the removal of HCN and other cyanogenetic compounds from seed and other plant products, the fermentation of tobacco, processing of tea, cocoa, coffee and vanilla, the artificial ripening of fruits, and the acceleration of germination. Tobacco fermentation is taken as an example. By the ordinary process it takes 4-10 days; by the new method perfect maturation is obtained in 48 hours. By employing a proved microbicide as starter all possibility that the fermentation was due to micro-organisms or to diastase secreted by them was eliminated, and by operating at a temperature of not more than 60° C. the possibility of purely chemical catalysis was eliminated; the fermentation was thus shown to be of a purely enzymatic nature. A brief description of the tobacco process, which is operated under vacuum, includes the charging of the autoclave, the introduction of the starter (ethylene oxide) and finally the actual fermentation.

3715. SIDDAPPA, G. S., AND BHATIA, B. S.

Role of pH in the xylene extraction method for the estimation of ascorbic acid.

Curr. Sci., 1953, **22**: 173, bibl. 1.

A brief account of experiments which demonstrate the importance of the adjustment of the pH of the reaction

mixture to obtain correct values for ascorbic acid in preserved fruits and vegetables using the xylene extraction method.—*Div. Fruit Tech., C.F.T.R.I., Mysore.*

3716. RABOURN, W. J., AND QUACKENBUSH, F. W.

The occurrence of phytoene in various plant materials.

Arch. Biochem. Biophys., 1953, **44**: 159-64, bibl. 6.

Phytoene was detected in 11 different fruits and vegetables. A method of assay for phytoene in plant materials is presented.—*Purdue Univ., Indiana.*

Physiology.

(See also 3771c, m, u, x, 4148, 4149, 4268, 4731.)

3717. ILJIN, W. S.

Influencia de la sequía sobre algunos de los procesos fisiológicos de las plantas. (The influence of drought on some of the physiological processes in plants.)

Rev. Fac. Ing. agron. Maracay, 1952, **1**: 5-67, bibl. 120.

The author summarizes his work, carried out over a long period of years, on the effect of drought on stomatal movement, carbon assimilation, starch metabolism, respiration, osmotic pressure and sugar content of plants, the death of plants resulting from drought, and the causes of variation in drought resistance. A wide range of plants was studied, some of them being horticultural; most of them were studied under natural conditions.

3718. ILJIN, W. S.

Causes of death of plants as a consequence of loss of water: conservation of life in desiccated tissues.

Bull. Torrey bot. Cl., 1953, **80**: 166-77, bibl. 31.

Rate of dehydration and rate of restoration of water are found to be critical factors for survival of protoplasts of desiccated tissues. They die, however, if dried quickly and if permitted to recover their water quickly. Recovery from repeated plasmolysis and deplasmolysis becomes increasingly difficult and eventually death results when the cells are exposed to change in turgor. In cells that possess large vacuoles, plasmolysis and deplasmolysis cause a greater amount of contraction and swelling of the protoplasts than in cells with small vacuoles. Different species of plant differ greatly in tolerance to desiccation. Differences in cell size, cell shape, ratio of volume to surface area, and osmotic concentration of sap are correlated with differences in tolerance. [From author's summary.]

3719. HYLMÖ, B.

Transpiration and ion absorption.

Physiol. Plant., 1953, **6**: 333-405, bibl. 107.

The test plant used at the Botanical Laboratory, Lund, Sweden, was a variety of yellow, round-seeded pea, Svalövs Torsdagsärt II.

3720. LEE, A. E., AND WHALEY, W. G.

Effects of thiamin, niacin, and pyridoxine on interval growth of excised tomato roots in culture.

Bot. Gaz., 1953, **114**: 343-8, bibl. 10.

The growth of excised tomato roots was determined at weekly intervals for 4 weeks when the roots were grown in culture media (a) without vitamin supplements or (b) with individual or combined vitamin supplements of thiamin, niacin, and pyridoxine. Growth in all media was about the same during the first week. Little additional growth was obtained from roots grown in unsupplemented medium or in media containing pyridoxine or niacin alone. In media containing thiamin alone, or combinations of any two or three of the vitamins, growth of roots was significantly greater than in the other media. In medium containing all three vitamins, growth was significantly greater than in any other medium. Between the third and fourth weeks, however, growth in all cultures, including those fully supplemented, was markedly reduced. [From authors' summary.]—Plant Res. Inst. and Clayton Found. for Res., Univ. Texas.

3721. GLIGIĆ, V.

Metod kulture u suznom soku. (Plant culture in exudated sap.) [German summary $\frac{1}{2}$ p.]

Rad. poljopr.-šumarsk. Fak. Univ. Sarajevu, 1952, 1: 125-30, bibl. 5, illus.

Germinating bean plants, with their cotyledons removed, grow well upon vine sap, but birch sap was found unsuitable. The possibility of using the technique in plant physiological investigations is considered and experiments on vegetative hybridization by this method are recommended.

3722. WIGHTMAN, F., AND BROWN, R.

The effects of thiamin and nicotinic acid on meristematic activity in pea roots.

J. exp. Bot., 1953, 4: 184-96, bibl. 5.

The results of experiments with isolated pea roots are presented showing the effects on growth of providing nicotinic acid and thiamin in the medium. [From authors' summary.]

3723. FRIES, N.

Limiting factors in the growth of the pea seedling root.

Physiol. Plant., 1953, 6: 292-300, bibl. 8, illus.

In decotylyzed pea seedlings maintained aseptically in darkness, root-growth very soon ceases completely or almost completely. By adding arginine, glycine, and adenine (0.3 millimole per litre of each) to the nutrient medium, it proved possible to produce an almost normal growth rate of the root. Arginine could be exchanged for ornithine or citrulline, adenine for hypoxanthine, these substituents probably serving as precursors in the biosynthesis of arginine and adenine, respectively. [Author's summary.]—Univ. of Uppsala.

3724. TONZIG, S.

Ricerche sulla fisiologia dell'acido ascorbico. I. L'acido ascorbico come equilibratore degli stimoli nella cellula vegetale. Introduzione. (Research on the physiology of ascorbic acid. I. Ascorbic acid as a regulator of stimuli in plant cells. Introduction.) [English summary 1 p.]

Nuovo G. bot. ital., 1950, 57: 468-97, bibl. 178 [received 1953].

This paper is the first of a series on investigations which

the author and his colleagues have been conducting for some years on the physiology of ascorbic acid in plants. One of the chief characters of plant plasma is the variation that takes place in its viscosity, which alters in a highly significant manner in response to external stimuli of the most diverse kinds, with concomitant absorption or loss of water by the plasmatic colloids. The condition of the colloids does not depend entirely on external stimuli but is controlled in part by hormone-like regulators, the most important of which are the auxins. It is probable that the functions on which the auxins act are regulated not only by stimulating substances but also by other substances with an opposite action. The author considers that ascorbic acid is a natural regulator of wide occurrence and great importance, capable of acting as an anti-auxin. Research by other workers is reviewed.

3725. LONA, F., AND GIOVANOLA, E. P.

Ricerche sulla fisiologia dell'acido ascorbico. VII. Contenuto in acido ascorbico delle piante in relazione al fattore termoperiodico. (Research on the physiology of ascorbic acid. VII. The ascorbic acid content of plants in relation to the thermoperiodic factor.) [English summary 12 lines.]

Nuovo G. bot. ital., 1951, 58: 462-74, bibl. 10 [received 1953].

A study was made of the effect of variations in night (but not day) temperatures on the ascorbic acid content of the leaves of some herbaceous plants including *Nicotiana tabacum*, *Lycopersicum esculentum* and *Impatiens balsamina*. In general, an inverse relationship existed between night temperatures range 12°-28° C. and ascorbic acid content. The practical significance of this is discussed.

3726. TONZIG, S., TREZZI, F., AND NAVA, E.

Influenza dell'acido ascorbico e dell'acido indolacetico sul ricambio idrico della pianta. (The effect of ascorbic acid and indoleacetic acid on water exchange in plants.) [English summary 2 lines.]

Nuovo G. bot. ital., 1952, 59: 171-3.

Experiments with castor bean and pea (among other plants) demonstrated that ascorbic acid and indoleacetic acid have opposite effects on the absorption of water by plant cells, the latter favouring and the former impeding accumulation of water.

3727. COOKE, A. R.

Effect of gamma irradiation on the ascorbic acid content of green plants.

Science, 1953, 117: 588-9, bibl. 6.

Snapdragon and soya bean plants were grown near a source of constant gamma rays. From the preliminary analytical data obtained it would appear that the immediate effect of irradiation is a drop in the ascorbate level. This is followed a few days later by a rise and some time later by a second decrease. Possible causes of the increases in ascorbic acid content are discussed. The results of another series of experiments, carried out with cabbage, gladiolus, snapdragon, *Cosmos sulphureus*, *Hyoscyamus niger* and others, suggest that there may be some correlation between the normal ascorbic acid content of a plant and its sensitivity to irradiation.

3728. SPARROW, A. H., AND SINGLETON, W. R.
The use of radiocobalt as a source of gamma rays and some effects of chronic irradiation on growing plants.

Amer. Nat., 1953, **87**: 25-44, from abstr. in *Biol. Abstr.*, Sect. D, 1953, **27**, No. 20638.

Tradescantia paludosa and *gladiolus* were among the 19 species under test. The effect of irradiation on production of crown gall in tomatoes is also briefly reported.

3729. WETMORE, R. H., AND JACOBS, W. P.
Studies on abscission: the inhibiting effect of auxin.

Amer. J. Bot., 1953, **40**: 272-6, bibl. 10, illus.

The anatomy and physiology of the development of the abscission layer in *Coleus* leaves has been investigated. The abscission layer is first apparent, and is almost fully differentiated anatomically, in leaf pair 3. The pre-abscission interval of leaves at various positions along the stem (and thus of varying ages) shows a significant correlation with the amount of diffusible auxin produced by the leaves. Removing the leaf blades (and thus the auxin-sources) speeds up abscission very markedly. The leaf blades can be replaced in their inhibiting effect on abscission by the application of synthetic auxin. The experiments are interpreted as showing the dominant role of diffusible auxin from the leaf blades in controlling the normal order and intervals of leaf abscission. [Authors' summary.]—Harvard Univ., Mass., and Princeton Univ., N.J.

3730. ROSETTER, F. N., AND JACOBS, W. P.
Studies on abscission: the stimulating role of nearby leaves.

Amer. J. Bot., 1953, **40**: 276-80, bibl. 6, illus.

Evidence that intact leaves speed up abscission of nearby debladed petioles has been obtained by deblading in various patterns a clonal stock of *Coleus* plants. The younger, still growing leaves have a greater abscission-stimulating effect than the older, fully-grown leaves, but whether this is due to polar movement of the effect or to stronger stimulus from the younger leaves has not yet been established. Reasons for thinking that the abscission stimulator is not auxin but may be ethylene are briefly discussed. [Authors' summary.]—Princeton Univ., N.J.

3731. LATIES, G. G.
The dual role of adenylate in the mitochondrial oxidations of a higher plant. Transphosphorylating systems as a controlling factor in mitochondrial respiration.
Physiol. Plant., 1953, **6**: 199-214, bibl. 32, and 215-25, bibl. 15.

The investigations were carried out on material obtained from cauliflower buds.—Kerkhoff Labs of Biol., Calif. Inst. of Technol.

Growth substances.

(See also 3724, 3726, 3729, 3730, 3771g, k, 3816, 3817, 3853-3861, 3874, 3907, 3923, 3944, 3975, Section on Weeds and Weed Control, 4207, 4246, 4292, 4293, 4313, 4475, 4583.)

3732. WAIN, R. L.
Plant growth substances.
Lectures, Monographs Repts, roy. Inst. Chem., 1953, No. 2, pp. 16, bibl. 93, illus.

The author considers some of the chemical problems in

growth substance investigation, noting in conclusion that recent work has led into a new field of research developing logically from studies on the aryloxy acids. This, however, is not discussed here.

3733. LUCKWILL, L. C.
Plant hormone research at Long Ashton.
Science and Fruit, 1953, pp. 110-19, bibl. 29.

The author traces the course of the empirical work on growth substances which started as regards horticulture with the trials of Zimmerman and Hitchcock at the Boyce Thompson Institute in 1935 and has been in progress at Long Ashton since 1937. He shows how suggestions have been followed up, sometimes with unexpected results. Thus the incorporation of growth substances with seed of legumes was not found to increase growth and yield as had been supposed, but it was found to counteract the ill effects of certain seed dressings. The high claims made for induced parthenocarp were substantiated only under certain conditions and for particular plants. Fruit thinning, acceleration of maturity and prolongation of dormancy can indeed be achieved, but suitable methods still need to be determined. In fact the applied side has outstripped the fundamental side and temporarily at least a return to basic research has been found essential. Hence at Long Ashton enquiry is now being directed to the chemical nature of natural hormones. This involves the extraction, separation, estimation and identification of them and of growth inhibitors. Technique is being evolved for biological assay methods and for extraction and purification of natural hormones, and for their study by the chromatographic method. Finally much work has been devoted recently at Long Ashton to the relation between chemical structure and growth activity.

3734. MUIR, R. M., AND HANSCH, C.
On the mechanism of action of growth regulators.
Plant Physiol., 1953, **28**: 218-32, bibl. 40.

The relative activities of 117 chemical compounds including derivatives of indoleacetic acid, phenoxyacetic acid, phenylacetic acid and benzoic acid were determined on the basis of the molar concentration required to induce a minimal response in elongation compared with the molar concentration of indoleacetic acid inducing the same elongation. Recent hypotheses concerning the correlation of chemical structure with physiological activity of plant growth regulators are examined as explanations for the activity or lack of activity of di-ortho alkyl substituted analogues and the low activity or inactivity of mono-alkyl substituted analogues. It is concluded that the two-point ortho reaction mechanism affords the best working hypothesis although a few compounds at present do not seem to fit the hypothesis. [From authors' summary.]—Dep. Bot., State Univ. Iowa, and Dep. Chem., Pomona Coll., Claremont, Calif.

3735. VLITOS, A. J., AND MEUDT, W.
The role of auxin in plant flowering. 1. A quantitative method based on paper chromatography for the determination of indole compounds and of 3-indoleacetic acid in plant tissues.
Contr. Boyce Thompson Inst., 1953, **17**: 197-202, bibl. 18, illus.

This paper describes a technique for the quantitative determination of IAA and related compounds based on paper chromatography using isopropyl alcohol-ammonia water as solvent and 1% *p*-dimethylaminobenzaldehyde in *N* HCl as colour reagent. The optical density of the spots was determined with a densitometer. Although ether extracts of leaf and stem tissues of soya bean, tobacco, spinach, barley and tomato gave negative results for IAA, the compound was detected in barley and tobacco tissues after alkaline hydrolysis, leading to the view that IAA in the material examined is present in a "bound" form.

3736. GARTNER, J. B., HANEY, W. J., AND HAMNER, C. L.

The effect of indoleacetic acid and amount of solar radiation on heterosis in the snapdragon (*Antirrhinum majus* L.).

Science, 1953, 117: 593-5, bibl. 2, being *J. Art. Mich. agric. Exp. Stat.* 1414.

In the course of studies with hybrid snapdragons it became apparent that light was a factor in determining the degree of both heterosis and response to indoleacetic acid treatment. Since IAA is inactivated by riboflavin in the presence of light, it was thought possible that a difference in auxin level may account for the phenomenon of heterosis and that it may be influenced by the amount of light received. This hypothesis was then confirmed experimentally: In plants grown from December through February heterosis (assessed by height and dry weight) was less, and response to IAA more pronounced, than in plants grown from March through May. F_1 plants, irrespective of the season, were more sensitive to IAA than either parent. Finally it was shown in tests on cucumber seedlings that the F_1 was less effective than its parents in inactivating indoleacetic acid.

3737. THIMANN, K. V.

Hydrolysis of indoleacetonitrile in plants.

Arch. Biochem. Biophys., 1953, 44: 242-3, bibl. 5.

In contrast to *Avena* coleoptiles and *Lupinus* hypocotyls, pea stems failed to respond to indoleacetonitrile. The same solution, however, viz. indoleacetonitrile at 10 mg./l., after being squeezed out of coleoptile sections which had been immersed in it for 48 hours, induced typical curvatures in split pea stems, which shows that *Avena* coleoptile tissue converts indoleacetonitrile to indoleacetic acid. It is suggested that the distribution of the enzyme responsible for the hydrolysis of nitrile to acid may be of general importance in the auxin relations of higher plants.—Harvard Univ.

3738. KLEIN, W. H., AND LEOPOLD, A. C.

The effects of maleic hydrazide on flower initiation.

Plant Physiol., 1953, 28: 293-8, bibl. 5.

Experiments with chrysanthemums, peppermint and other plants suggested that maleic hydrazide inhibits the production of flower primordia primarily through its inhibitory effect on growth, rather than by any specific action against the photoperiodic mechanism itself.—Dep. Hort., Purdue Univ., Lafayette.

3739. GREULACH, V. A.

Effect on plant growth of some compounds with structural similarities to maleic hydrazide.

Science, 1953, 117: 601-3, bibl. 17.

The tests were carried out on young bean, sunflower and tomato plants to help clarify the mechanism of maleic hydrazide inhibition of plant growth.—Univ. North Carolina.

Seeds and seed treatment.

(See also 3733, 3771s, 4731.)

3740. ROCA, J., AND ONDARZA, R.

Estudios sobre la actividad enzimática en el proceso de germinación. III. Catalasa en variedades de frijol. (Studies on enzymatic activity during germination. III. Catalase in french bean varieties.)

An. Inst. Biol., 1951, 22: 3-9, bibl. 9 [received 1953].

Catalase activity was studied in germinating beans for 3 weeks. Activity was 4 times greater in the leaves than in the roots and stems. Varietal differences in activity were observed.

3741. CAVAZZA, L.

Osservazioni sul rigonfiamento dei semi duri di *Gleditsia triacanthos*. (Notes on the swelling of the hard seeds of *Gleditsia triacanthos*.) [English summary 7 lines.] *Nuovo G. bot. ital.*, 1951, 58: 600-2 [received 1953].

Studies on water absorption by the hard seeds of *Gleditsia triacanthos* demonstrated the effect of the anisotropic swelling of the endosperm. The rapid increase in volume of the endosperm together with the very rapid increase in surface area of the seed in the first stages of swelling overcome the resistance of the impermeable integument and thus facilitate further penetration of water. [See also *H.A.*, 22: 3341.]

3742. CAVAZZA, L.

Osservazioni sul comportamento dei semi duri all'attacco delle tignole. (Notes on moth attack on hard seed.) [English summary 6 lines.]

Nuovo G. bot. ital., 1951, 58: 602-3 [received 1953].

The moth *Sitotroga cerealella* attacked only the dark and not the light seeds in a sample of old seed of french honeysuckle, *Hedysarum coronarium*. This was probably due to the greater moisture content of the dark seeds and perhaps to some chemical change which they had undergone. The impermeable integument thus indirectly protects the seed from insect attack.

3743. SIEGEL, S. M.

Effects of exposures of seeds to various physical agents. II. Physiological and chemical aspects of heat injury in the red kidney bean embryo.

Bot. Gaz., 1953, 114: 297-312, bibl. 23, being *Contr. Hull bot. Lab.* 640.

Red kidney bean (*Phaseolus vulgaris*) embryos were exposed to 100° or 103° C. for up to 45 minutes. An

account is given of studies on the relation of heat injury to light, reducing agents, oxygen and indole-3-acetic acid, and on respiratory, amyloclastic, catalase and peroxidase activity, and on changes in chemical composition.—Dep. Bot., Univ. Chicago.

3744. BOA, W.

Pelleted seed trials.

Tech. Memor. N.I.A.E. 91/53, 1953, pp. 12, illus.

Pelleted seed is seed coated with powders and dusts bonded with gum so that each seed is built up to uniform size and spherical shape. This report explains how pelleted seed is made, and gives an account of field trials at the National Institute of Agricultural Engineering in 1949 and 1950 with sugar beet, onions, carrots and lettuce. Although the method of pelleting which was used was not satisfactory for all the types of seed, there are a number of horticultural crops for which pelleted seed could be useful. [From author's summary.]

Nutrition.

(See also 3759, 3771p, 3772a, 4737.)

3745. FERTILISER AND FEEDING STUFFS JOURNAL.

A new fertilizer.

Fert. Feed. St. J., 1952, 38: 395-6, from abstr. in *Soils and Ferts*, 1953, 16, No. 1470.

In 5 years' tests in the United States glass frit containing B, Zn, Fe, Cu, Mn, I and Mo was directly applied to the soil or mixed with NPK fertilizers. Good results were obtained with horticultural crops.

3746. BUCHNER, A.

Die Wirkung der Chlorionen auf den Kohlenhydratstoffwechsel in Abhängigkeit von der Kaliversorgung der Pflanze. (The effect of chlorine ions on the carbohydrate metabolism of plants in relation to potassium supplies.)

Z. Pflernähr. Düng., 1951, 54: 28-36, bibl. 9, illus. [received 1953].

(1) The effect of Cl ions on the carbohydrate metabolism of plants depends on K supplies. While normal K supplies favour synthetic processes, K deficiency intensifies the hydrolytic activity which is an effect of chloride manuring. (2) Injuries to the leaf margin resembling symptoms of K deficiency occurred in dwarf beans as a result of chloride manuring; these injuries were caused by an unfavourable K:Cl ratio (K:Cl = <1), i.e. by an excess of Cl not compensated by K. (3) The symptoms are the expression of a physiological K deficiency occurring in the presence of a relatively high K content. [Translation of author's summary.]—Techn. Hochschule München, Weihenstephan.

3747. BREAZEALE, E. L., AND McGEORGE, W. T.

Cation uptake by plants as affected by an applied potential.

Soil Sci., 1953, 75: 443-8, bibl. 4, illus.

Further experimental evidence is presented in support of the theory that cation uptake by plants is an electrical phenomenon [see *H.A.*, 21: 3201]. Uptake of Na, K, and Ca is actively stimulated at the respective potentials of these cations. By using two polarographs and two

separate reservoirs containing different salt solutions, the uptake of two cations by a single plant can be stimulated. An experimental technique is presented to show how the polarograph can be useful in a study of ion uptake by plants by supplying a source of controlled direct current voltage. It may be particularly useful for studying uptake of cations in excess or luxury amounts. [Tomato plants were used as experimental material.] [Authors' summary.]—Ariz. agric. Exp. Stat.

3748. SOILS AND FÉRTILIZERS.

A bibliography on the application of plant nutrients by leaf spraying.

Soils and Ferts, 1953, 16: 246-62.

Most, though not all, of the abstracts collected here have already appeared in *Soils and Fertilizers*. They are grouped under the following headings: General; nitrogen; phosphorus; minor elements; zinc; manganese; magnesium; boron; iron; and copper.

3749. PENNINGSFELD, F.

Topfpflanzenzüchtung durch Anstau. (Manuring of pot plants by subirrigation.)

Reprinted from *Gartenwelt*, 1951, 51: 133-5, 169, illus. [received May, 1953].

In experiments at the Institut für Bodenkunde und Pflanzenernährung, Weihenstephan, watering and manuring of pot plants by subirrigation saved labour, increased yields and improved quality, as compared with watering by hose and surface application of fertilizers. In several cases the results were further improved by the use of an artificial medium in place of soil. The tests were carried out with strawberry, cyclamen, *Asparagus sprengeri*, chrysanthemum and *Primula obconica*. The technique is described.

Soil problems.

(See also 3771i, v, 4428.)

3750. VAN DEN BERG, C.

De inundaties gedurende 1944-1945 en hun gevolgen voor de landbouw. Deel XII. De invloed van opgenomen zouten op de groei en productie van landbouwgewassen op zoute gronden. (The floods of 1944-1945 and their effects on agriculture. XII. The influence of absorbed salts on the growth and yield of agricultural crops on saline soils.) [English and French summaries 2½ and 3 pp. resp.] *Versl. Landbouwk. Onderz.* 58.5, 1952, pp. 118, bibl. 151, illus., fl. 4.25.

In order to study the salt uptake of crops on soils that had been flooded with sea water, the effect of various ions and ion-complexes on growth and yield, and the causes of variation in salt sensitivity among different crops, field and pot experiments were carried out in Holland during 1946-48. The chemical composition of a number of crop plants (cereals, sugar beet, flax, potatoes, horsebeans, red kidney beans and peas) on saline soils was studied at various stages of growth, together with the changes in soil conditions following flooding. The following are among the results obtained. Retardation of growth could be observed even during the germination period, but at this stage the salt sensitivity of crops was not the same as at harvest time. It is shown that reduced water absorption is not the only factor responsible for reduced growth on saline

soils, but that absorbed salts have a specific effect. The effect of degree of soil salinity on the Cl content of the plants varied considerably with the crop. With increasing salinity the N content of legumes remained constant but that of cereals increased, the percentage of P_2O_5 decreased in legumes only, and there was a remarkable increase of Ca and Mg in peas. In several crops a relationship was found between the percentage of Ca in the total absorbed cations and the uptake of Cl and cations. The sensitivity of crops was closely connected with the increase in Cl and cation content in the plant with increasing salt content of the soil. The more tolerant crops were to salt, the better were they adapted to limit salt accumulation and the lower was the percentage Ca in the total absorbed cations. Several characteristic injuries of plants in salty soils were recognized as due to K or Ca deficiency. Observations were also made on the influence of climate on salt injury.

3751. BROWN, C. P.

Egypt grows rich crops in salt soil.

Grower, 1953, 40: 33-5.

A popular article on the successful methods of growing fruit, vegetable and fodder crops in the Mariout district of Egypt where the soil and irrigation water contains 2% soluble salts and the rainfall averages less than $\frac{3}{4}$ in. a year. The effects of irrigation with saline water have been largely offset by the utilization of indigenous desert plants, such as atriplex, liquorice and mesembryanthemum, which absorb the salt.

3752. WALKER, J.

Behaviour of certain woody plants in alkaline soil.

From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

In 1945 various plants were set out in an area, part of which was known to be highly impregnated with salts. Survival was highest in Siberian salt tree, silver buffalo-berry, Russian olive and common sea buckthorn. Of these species Russian olive and silver buffalo-berry would appear to be the most suitable where a tall hedge or wind barrier is wanted, and Siberian salt tree and common sea buckthorn for a hedge of medium height.—Indian Head, Sask.

3753. JACKS, H.

Disinfection of nursery soil.

Bull. N.Z. Dep. Agric. 363, [1953?], pp. 12, bibl. 8, illus.

Notes are given on disinfection by heat (low- and high-pressure steaming, and electricity), by chemicals (drenches, formalin, Cu oxychloride, phygon), and by fumigation (chloropicrin and D-D separately and in mixture). A diagram is given of a low-pressure steam plant.

3754. MARX, T., AND SAHM, U.

Die Müll-Selbstgärung, ihre Wärmeentwicklung und Nutzung zu Frühbeetpackungen. (The fermentation of town waste, its heat production and utilization in hot-beds.) *Z. Pflernähr. Düng.*, 1951, 54: 59-64, bibl. 6 [received 1953].

Fresh, ground town waste with a high organic content was found to be a suitable substitute for horse manure and leaf mould as a source of heat in hot-beds, especially

if used for early crops, though the heat produced is not quite equal to that developed by the traditional materials. To avoid damage to young roots the waste should be covered with a 20-25 cm. layer of compost. The trials were carried out for 4 years at the Biol. Zentralanst. Berlin-Dahlem, where the addition of leaf mould to town waste is being studied in further experiments.

Soilless culture.

(See also 3749, 4468.)

3755. EASTWOOD, T.

Hydroponics and food production.

Foreign Agric., 1953, 17: 55-8.

This article should do much to dissuade those who think that hydroponics is the easy way. Hydroponics, whether water, sand or gravel culture, may have an economic place in food production in such places as barren oceanic islands, large mainland areas of an arid nature and other places where adequate agricultural soils are lacking and the import of fresh vegetables is very difficult. It does not do away with ordinary horticultural problems and it demands rather more expert attention than the ordinary methods of soil culture. Among technical problems which need exact attention are: control of the mineral ion concentrations of the nutrient solution, maintenance of desirable pH of solution, control of rate and frequency of irrigation.

3756. PENNINGSFELD, F.

Hydrokultur im Erwerbsgartenbau. (Hydroponics in commercial horticulture.)

Schriften z. Förder. d. Gartenb. 4, 1953, pp. 16, illus.

The author, head of the department of soil science and plant nutrition at Weißenstephan, gives a popular account of the results obtained at this institute in several years' experiments. In a study of the economics of hydroponics for flower growing it was found that yields from nutrient solution cultures exceeded those from soil by 10-30% when the soil plants were grown under optimum conditions. Generally, the quality of the water culture plants was also superior. Carnations proved to be particularly suitable for soilless culture. Work on glasshouse construction, heating and CO₂ supply is in progress at Weißenstephan and other German research institutes.

3757. BOOER, J. R.

The ring culture method.

World Crops, 1953, 5: 246-7, 253.

ALLERTON, F. W.

A new system of cultivation in greenhouses.

Gdnrs' Chron., 1953, 134: 24-5.

A description is given of the newly devised ring culture method of raising greenhouse crops which offers possibilities as an alternative to established procedures in hydroponics. The plants are grown in raschig rings containing potting compost and placed on an inert porous base through which their roots can wander freely. Tomato plants in 10-inch rings gave average yields of 21 lb.—Tilgate Res. Stat., Crawley, Sussex.

3758. STROMME, E. R., AND WYND, F. L.

The influence of the pH value of the medium on the availability to plants of iron and manganese in glass frits.

Lloydia, 1953, 16: 1-58, bibl. 41, illus.

The growth of plants in nutrient solution at 4 different pH levels was compared in (a) frits employed as the supporting medium in hydroponic gravel culture and containing a number of different percentages of Fe_2O_3 and MnO_2 , and (b) a quartz gravel control. Fe and Mn were omitted from the nutrient solution when they were the variable factor in the frit. At all pH levels the frit cultures produced normal green plants and the gravel cultures more or less chlorotic plants. The Fe in the frit was insoluble and the plants obtained it by contact absorption; the Mn was soluble especially at low pH values.

3759. HEWITT, E. J.

The use of sand-culture methods for investigations on plant nutrition.

Science and Fruit, 1953, pp. 171-83, bibl. 39, illus.

The great contribution made towards the elucidation of nutritional disorders in plants by the development of sand culture methods at Long Ashton in the last 30 years is briefly outlined in this paper. The subject is dealt with under the following headings: origin of culture techniques; development of large scale sand culture; materials and other requirements for large scale sand cultures for experiments on micronutrients; containers; sand; water supplies; nutrient reagents; applications of the technique. [See also T.C. 22 by the same author listed on back cover of this number of *H.A.*]

Glasshouse problems.

(See also 4283.)

3760. MINISTRY OF AGRICULTURE, LONDON.

The construction and heating of commercial glasshouses.

Bull. Minist. Agric. Lond. **115**, revised 1953, pp. 75, illus., 3s.

Since the first edition of this bulletin appeared in 1949 [see *H.A.*, 19: 1741] it has been considerably revised and extended. Some gaps have been filled by the addition of information on such subjects as glasshouse orientation, the preservation of timber, the design of ancillary buildings including sheds for soil sterilizing and mixing, potting and packing, and the construction of forcing houses such as are used in the Spalding area for forcing bulbs. Detailed information on Dutch light structures, on the other hand, has been omitted, as these are to be dealt with in a separate bulletin to be published shortly. The appendix on types of timber used for glasshouse frames includes notes on some of the imported hardwood timbers recently used to overcome the present shortage of softwoods. In the section on heating there is a useful summary of the advantages and disadvantages of steam heating, and more information is given on soil warming.

3761. BEATTIE, J. H.

Greenhouse construction and heating.

Fmrs' Bull. U.S. Dep. Agric. **1318**, revised 1952, pp. 38, illus.

Full particulars are given with diagrams and photographs.

3762. HUDSON, J. P.

Keeping a steady temperature in propagating houses.

Grower, 1953, 39: 1201, 1203, illus.

Work at the John Innes Horticultural Institution has shown that the number of flowers on the first few trusses of tomato plants can be increased by accurate control of the temperature in the propagating house. Notes are given on the ways in which temperature control has been improved in the propagating house at Nottingham University by eliminating draughts and installing electric space heating to supplement the hot water system.

3763. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

Insulation of glasshouses. Insulation of cold frames by means of thin foils.

Tech. Memor. N.I.A.E. **1169/HOR**, 1949, pp. 5, illus. [received 1953].

Temperatures were recorded inside three similar cold frames. "Ardor" foil was placed under the glass of one, first at night only and then day and night, and in both cases minimum temperatures at night were increased by 2° to 7° F. compared with a non-insulated frame. Foil on day and night reduced the diurnal temperature range to one-quarter. With sacks on the third frame, continuously, the temperature range was $1\frac{1}{2}$ times that with foil. In a frame covered with foil at night, germination of cauliflower seed was advanced one week compared with a non-insulated frame. It was concluded that experiments with foil blinds in a greenhouse would be worth while. [Author's précis.]

Marketing.

3764. CENTRAL BUREAU OF HORTICULTURAL AUCTIONS IN THE NETHERLANDS.

The auction system of horticultural marketing in the Netherlands.

Publ. centr. Bur. hort. Auctions, Netherlands, [undated, received 1953], pp. 61, illus., obtainable from Fruit & Vegetable Products Ltd., 13 James Street, London.

An outline is given of the development and working of the Dutch system of horticultural marketing by co-operative auction, and of the activities of the Central Bureau. Information is included on the supply, packing and grading of individual fruits and vegetables.

3765. (BLOUNT, C. R.)

A fruit and vegetable buying guide for consumers.

Home and Gdn Bull. U.S. Dep. Agric. **21**, 1952, pp. 61.

Hints are given on buying 24 species of fruit, 46 kinds of vegetable and 7 types of melon.

Practical devices.

(See also 3771r, 3983, 4162, 4456.)

3766. DEUTSCHE BAUMSCHULE.

Ein neues Rodegerät. (A new implement for digging up trees in the nursery.)

Dtsch. Baumsch., 1953, 5: 16-6, illus.

A plough, patented in Austria, is described which cuts the roots of nursery trees to a depth of 50 cm. It is

drawn through the rows by a winch, which in its turn is driven by a tractor. The trees may be left standing after the roots are cut, until they are due for lifting. Figures are given on the performance of the winch-plough combination which is capable of operating over distances of up to 300 m. The winch, it is suggested, would be useful also in the field where the avoidance of soil compression by tractors is desirable.

3767. ANON.

Introducing a new and versatile cloche.

Comm. Grower, 1953, No. 3002, pp. 72-3, illus.

A description is given of a new continuous cloche of the barn type, called the Venticult, that has recently undergone exhaustive tests in the Tamar Valley. Among the advantages claimed for this type of cloche are rigidity, the almost complete elimination of glass breakage, a wide range of ventilation, the possibility of attending to the crop without removing the cloches, speed of erection, and compactness in stacking.

3768. ANON.

And now—the soil box.

Comm. Grower, 1953, No. 3003, p. 117, illus.

The Century Seed Box which is used to make blocks of soil the size and shape of seed trays is described. The block can be used for seeds or cuttings and it is claimed that growth is quicker than in the normal seed box. The same principle has been employed in the design of a tomato and chrysanthemum box which obviates the use of 12-in. pots.

3769. FRIBOURG, H. A.

A rapid method for washing roots.

Agron. J., 1953, 45: 334-5, illus.

The author describes a simple home made apparatus consisting of trays, a 50-gallon drum and a slatted platform fitted with overhead sprinklers. By it he was able to reduce the time necessary for thoroughly washing the roots of such a plant as alfalfa from 30 man-minutes a sample to 45 man-minutes for 14 samples.

3770. LEVINE, M.

A heat chamber for the study of the crown gall disease under controlled temperature and humidity.

Bull. Torrey bot. Cl., 1953, 80: 217-24, bibl. 6, illus.

A description is given of a heat chamber with an automatic, electrically controlled device for heating, and for vaporizing water and feeding water for humidification.

Noted.

3771.

a AXELROD, B., AND OTHERS.

The metabolism of hexose and pentose phosphates in higher plants.

J. biol. Chem., 1953, 202: 619-34, bibl. 32.

b BROWN, G. L., JACKSON, S. F., AND CHAYEN, J.

Cytoplasmic particles in bean root cells.

Nature, 1953, 171: 1113-14, bibl. 7, illus.
Vicia faba.

c BUDNICKAJA, E. V.

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Farmers' produce markets in the United States. Part III. Shipping point fruit and vegetable markets.

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Science and Fruit, 1953, pp. 277-89, illus.

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Effects of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid on mitosis in *Allium cepa*.

Bot. Gaz., 1953, 114: 274-83, bibl. 12, illus.

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J. exp. Bot., 1953, 4: 173-83, bibl. 29.

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Structuurregelaars en tuinbouw. (Synthetic soil conditioners in horticulture.) [English summary ½ p.]

Meded. Dir. Tuinb., 1953, 16: 357-60.

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The contribution of the colonial empire to world food supplies.

J. roy. Soc. Arts, 1952, 100: 226-36, bibl. 3.

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Ann. appl. Biol., 1953, 40: 231-49, bibl. 23, illus.

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Trade in horticultural specialties 1890-1950 [in the U.S.A.]. A statistical compendium.

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Zbl. Bakt. I, 1952, 158: 205-17, from abstr. in *Z. PflKrankh.*, 1953, 60: 358.

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Agric. Engng St. Joseph, Mich., 1953, **34**: 246-50, bibl. 14.
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Report on sodium in plants.
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Muligheter, mål og midler for hagebruket i Nord-Norge. (Horticulture in northern Norway, its present position and future possibilities.)
Gartneryrket, 1953, **43**: 183-90, 192.
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Bull. Minist. Agric. Lond. **147**, 2nd edition, 1953, pp. 30, bibl. 12, illus., 2s. 6d.
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Statuten, Reglementen en Voorschriften van de Nederlandse Algemene Keuringsdienst voor Groente- en Bloemzaden. (Laws and regulations of the Dutch State Inspection Service for Vegetable and Flower Seeds.)
 [Publ.] *N.A.K.G. Nederland*, The Hague, 1953, pp. 86.
 A neat and handy compendium.
- t NICHOLAS, D. J. D.
The mineral nutrition of fungi with special reference to *Aspergillus niger* and *Penicillium glaucum*.
Science and Fruit, 1953, pp. 184-204, bibl. 56, illus.
- u NRIČPOROVIČ, A. A.
Photosynthesis of plants as a factor in productivity. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1952, No. 4, pp. 3-30, bibl. 48.
- v POWWER, A.
Laboratoriumproeven met krilium. (Laboratory trials with krilium.) [English summary 11 lines.]
Meded. Dir. Tuinb., 1953, **16**: 360-2.
 On various soil types.
- w SCOTT, F. M., AND LEWIS, M.
Pits, intercellular spaces, and internal "sub-erization" in the apical meristems of *Ricinus communis* and other plants.
Bot. Gaz., 1953, **114**: 253-64, bibl. 21, illus.
 Including *Vicia faba*.
- x SIVADJIAN, J.
The part played by chlorophyll in plant transpiration studied by a new method: Hygrophotography.
Science, 1953, **117**: 606-7, bibl. 7, illus.
- y STEINBERG, C.
Ricerche sull'istogenesi dell'apice vegetativo di alcune specie del genere *Solanum*. (Histological studies on the growing point of some *Solanum* species.) [English summary 9 lines.]
Nuovo G. bot. ital., 1950, **57**: 319-34, bibl. 16, illus. [received 1953].
Solanum lycopersicum and *S. nigrum* were among the test plants.
- z TEMPANY, H.
The influence of introduced crops on colonial economies.
Emp. Cotton Grs' Rev., 1952, **29**: 83-93, bibl. 25, reprinted in part in *World Crops*, 1953, **5**: 241-5.

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- a VIRTANEN, A. I.
The use of seeds with low content of trace elements in studies on essentiality of micro-nutrients.
Plant Physiol., 1953, **28**: 323-4, bibl. 3.
- b WEBER, J. R.
Upward movements of radioactive phosphorus in three different plants.
Proc. Ia Acad. Sci., 1952, **59**: 141-4, from abstr. in *Biol. Abstr., Sect. D*, 1953, **27**, No. 20615.
 Including tobacco.
- c WITHROW, R. B., AND ELSTAD, V.
Water-cooled lamp systems with refluxing aqueous filters.
Plant Physiol., 1953, **28**: 334-8, bibl. 5.

TREE FRUITS, DECIDUOUS.

General.

(See also 4739, 4748, 4750.)

3773. GULJČAK, F. JA., AND IVANOVSKIĖ, A. I.
Better attention to northern fruit and berry growing. [Russian.]

Sad i Ogorod, 1953, No. 6, pp. 21-7, illus.

Interesting notes are given on attempts to grow tree and soft fruits at various points in the far north of the U.S.S.R. Between latitudes 59° and 61° N, apples, sour cherries and strawberries, and still farther north red and black currants are reported to be cultivated. Of the berry fruits currants appear to be the most hardy, and wild forms are found upon the taigas and tundras stretching almost to the shores of the Arctic. The tree fruits are trained in prostrate form and both tree and soft fruits are covered for the winter. Suitable varieties are mentioned and improvement work in progress is briefly outlined.

3774. BELOCERKOVSKAJA, E. N., AND SUHOĖVA-NENKO, N. G.

Fruit growing in Kamchatka. [Russian.]

Sad i Ogorod, 1953, No. 7, pp. 29-32, illus.

The first small orchard on the Kamchatka peninsula was established in 1930 and a nursery in 1932. By 1952 the nursery had a collection of 82 varieties of small and tree fruits and in the same year distributed 60,000 raspberry and 40,000 currant bushes and a quarter of a million strawberry plants. Suitable (frost resistant and early) varieties of apples and soft fruits are listed and notes are given on the cultivation of fruit trees including propagation, fertilization, artificial pollination and frost control in the spring by smoke.

3775. TUKEY, H. B.
Blossoms of horticulture.

Rural New-Yorker, 5 March, 1953, pp. 154, 158.

Note on pomological scenes in the United Kingdom, France and Italy by one of America's leading pomologists.

3776. FJÄDERHANE, A. M.
Arbetsstudier i trädgårdsodlingen. (Time studies in horticulture.)

Medd. Alnarpsinst. trädgårdsekon. Byrån 12, 1952, pp. 67.

For a brief outline of the time study scheme see *H.A.*, 23: 1434. The present bulletin deals (1) with work in the nursery such as the trimming of pear, apple and rose rootstocks, the planting of rose rootstocks, the budding and grafting of roses and various fruit trees and the tying of fruit trees after grafting; and (2) with various operations in fruit growing, such as planting, pruning, spraying and picking of top and small fruit. The latter section (pp. 10-67) is supplementary to *Medd.* 8 [*H.A.*, 23: 1515].

3777. FJÄDERHANE, A. M.
Vad kostar det att producera 1 kg. frukt?
(The cost of producing 1 kg. of fruit.)
Sver. pomol. Fören. Årsskr. 1952, 1953, 53: 5-12.

The figures for pome and stone fruits presented for 1950 and 1951 have been worked out from questionnaires by

the horticultural economic bureau, Alnarp, with 39 growers collaborating.

3778. RIEMENS, J. M.
Fruitteelt onder glas. (Fruitgrowing under glass.)

P. Noordhoff N.V., Groningen, *E.L.T.O.-Serie* 40, 1953, 9×6 in., pp. 151, illus., fl. 3.25.

The information in this little handbook on fruit-growing under glass in Holland is concise, well selected and up-to-date. Figures given in the introductory section show that there were 604 ha. grapes, 125 ha. peaches, 48 ha. Japanese plums and 3 ha. other fruits under glass in 1950. General information is also given on types of glasshouse, methods of heating, principles of pest and disease control and soil types and management. Subsequent sections deal with varieties, propagation, culture, pest control and packing of grapes, peaches and Japanese plums in turn, while a final section is devoted to the minor fruit crops grown under glass, i.e. red currants, pears, apricots, figs and cherries.

3779. MICKLEM, T., KRIEL, P. E., AND STUBBINGS, W. A. K.

The apple industry in the Western Cape Province and Langkloof.

Dec. Fruit Gr., 1953, 3 (1): 8-12.

The five main varieties grown are Ohenimuri, White Winter Pearmain, Granny Smith, Delicious and Golden Delicious. Ninety per cent. of all apple trees are confined to 3 areas, namely the Langkloof, Elgin and Ceres Koue Bokkeveld. Marketing as fresh fruit in S. Africa is the chief method of disposal. The last year or two has seen quite a fair tonnage disposed of in the U.K. The third avenue of disposal is canning, some 4,000 tons being canned annually between 1947 and 1952. There seems to be room for a new early apple variety. It is felt also that a larger supply of red apples for export may facilitate marketing overseas. The possibility of frame working to change the varietal balance is considered.

3780. DAVISON, J. R.
Apples on the M[urrumbidgee] I[rrigation] A[rea].

Agric. Gaz. N.S.W., 1953, 64: 134-5, 166.

Notes are given on trials with Granny Smith on various seedling stocks and on Northern Spy, and on orchard management in the Murrumbidgee Irrigation Area.

3781. KOBEL, F., AND OTHERS.
Sondernummer über Anbau und Verwertung der Kirschen. (Cherry cultivation and utilization [in Switzerland].)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 187-205, illus.

The journal issue for 30 May, devoted to cherry growing in Switzerland, includes the following articles: F. Kobel, The layout of cherry plantations, pp. 187-90. R. Fritzsche, The young cherry tree, pp. 190-4. W. Schmid, The control of the cherry fruit fly, as affected by this year's spring frost, pp. 196-7. S. Blumer, The Pfeffinger disease of cherries, pp. 197-9. Two further

articles deal with the manufacture of non-alcoholic cherry juice and of cherry spirit.

3782. EVERS, P. H.

In hoeverre wijken de door de telers aangevoerde kersen in kwaliteit, kwantiteit en aanvoertijd af van het door de handel gevraagde? (How much do cherries offered by the grower differ in quality, quantity and time of arrival from the demands made by the trade?) [English summary $\frac{1}{4}$ p.] *Meded. Inst. Vered. Tuinbouwgew.* 50, 1953, pp. 20-3.

Quality of cherries is a more important requirement in the trade than variety, apart from the fact that many varieties have excessively small fruits. Fruit is often picked too early, and is not graded or packed sufficiently well. Long distance shipment should be avoided.

3783. EDGERTON, L. J.

Peach growing.

Ext. Bull. Cornell agric. Exp. Stat. 869, 1953, pp. 39, illus.

In the United States the peach is commercially the most widely grown tree fruit. This bulletin, designed primarily for New York growers, provides information on all aspects of crop production from selection of orchard site to marketing, and includes brief descriptions of 19 varieties.

3784. KRIEL, P. E., AND MICKLEM, T.

The pear industry [in Western Cape Province, S.A.].

Dec. Fruit Gr. 1952, 2 (9): 15-23.

The chief varieties for the export trade with the U.K. are Bon Chrétien [Williams], Beurré Bosc, Packham's Triumph and Beurré Hardy. The early varieties are in competition with pears from Argentina, the late with those from Australia and New Zealand. The location of plantings of different varieties is stated.

3785. GOOR, A., AND LIEBERMAN, J.

The quince. [Hebrew, English summary p. 1 $\frac{1}{2}$.]

Sifriath Hassadeh, 1953, pp. 32, bibl. 17, illus.

At present quinces are grown only on a small scale in Israel, but an extension of the industry is advocated for the following reasons: Improvements in methods of codling moth control and jam manufacture, tolerance of quince to climates and soils unsuitable for apple production, and resistance to *Sclerotium rolfsii*, a root rot disease to which large areas under apple in Israel have succumbed. Varieties, methods of propagation and cultivation, as well as pests and diseases are discussed.

3786. CORRIERI, R., Jr.

Ressurgimento do marmeleiro. (Revival of the quince.)

Bol. Agric. Minas Gerais, 1952, 1 (4): 19-24.

About 20 years ago quince production in Minas Gerais, Brazil, suffered severely from an epidemic of the fungus *Entomosporium maculatum*. Some of the orchards have recently been brought back into productivity by appropriate cultural and chemical measures. These include clearing away weeds and undergrowth to give the trees adequate sunlight, pruning to induce

short, strong growth, fertilizing well and mulching, and spraying with lime-sulphur when the trees are dormant, pre-blossom, post-blossom, and 20 days later. Notes are also given on raising trees from cuttings and establishing new plantations.

Breeding and varieties.

(See also 3891c, 3891i.)

3787. SVERIGES POMOLOGISKA FÖRENING.

Riktsortlista för färvävs- och husbehovsodling av frukt. (A list of top fruit varieties for commercial and amateur growers.)

E. Kihlströms Tryckeri A.-B., Stockholm, 1953, pp. 6, 2 maps.

This official list, issued by the Swedish Pomological Society, recommends top fruit varieties to the two types of grower, with special reference to the area (6 zones) in which they can be grown in Sweden.

3788. BLACK, M. W.

Recent development in fruit research in Great Britain. Varieties and rootstocks.

Dec. Fruit Gr. 1952, 2 (12): 6-10.

The author deals with popular English varieties of pear, apple, plum and strawberry with a note on rootstock work, especially that at East Malling.

3789. SPINKS, G. T.

Fruit breeding at Long Ashton.

Science and Fruit, 1953, pp. 162-70, bibl. 5.

The essentially practical aims of the plant breeder at Long Ashton have been:—*Apples*: the production of good dessert apples earlier than Worcester Pearmain, between that variety and Cox's Orange Pippin and still later, and of improved cider apples. *Pears*: production of varieties which are prolific, resistant to scab and of good dessert quality. *Plums*: production of early and late season varieties of good dessert quality and satisfactory cropping capacity. *Black currants*: production of varieties showing heavy cropping, large berries, easy picking and strigging, good marketing qualities, suitable growth habit and resistance to diseases and pests. In varying degree these aims have been fulfilled. Work on strawberry and raspberry breeding has been less successful, but a new blackberry named Ashton Cross shows advantages over Himalaya.

3790. DICKSON, G. H.

Pear breeding at Vineland, 1913-52.

From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

Two lines of work have been followed: (1) Open-pollinated seed from many female parents to obtain leads on desirable parents for future breeding work. (2) Crossing fire blight-resistant varieties with varieties bearing fruit of high quality.

3791. JAKOVLEV, P. N.

Breeding pears in central and northern zones of the U.S.S.R. [Russian.]

Sad i Ogorod, 1953, No. 6, pp. 5-8.

The author [a pupil of Mičurin] expresses the firm belief that hardy pear varieties can be obtained only by repeated hybridization. The most valuable material used in the work outlined was the wild Ussurian pear [*Pyrus ussuriensis*].

3792. BARKER, B. T. P., AND BURROUGHS, L. F.
Cider apple varieties then and now: a survey
of vintage-quality trials.

Science and Fruit, 1953, pp. 45-55, bibl. 4, illus.

In 1903 there were probably more than 1,000 varieties of apple considered to be and used as cider apples in the cider districts of England. Much work was done by Long Ashton on the evaluation of these varieties. Nowadays it is customary to group cider apples into 4 classes, viz. sweet, bittersweet, sharp and bittersharp, according to the amount of malic and tartaric acids present in the fruit. Very numerous other factors then come into play in determining value on any occasion, e.g. those assessed by the palate, rate of fermentation, soil, climate and weather, cultivation practice. Methods of maturing cider which affect the results of vintage trials are discussed. With a decline in cider orchards in recent years there is urgent need for replanting. To help growers to replant wisely the Cider Advisory Committee of the Institute has published lists of recommended varieties. A list of 14 such varieties with supplementary varieties to suit local conditions is given in this paper.

3793. CRNČEVIĆ, V., AND OTHERS.

Upotrebljivost nekih naših sorata jabuka za proizvodnju voćnih sokova. (Varieties of apple suitable for the manufacture of apple juice.) [English summary 1 p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 83-105, bibl. 13.

Analyses of a number of Yugoslav and foreign apple varieties showed that the domestic varieties have on the whole a lower sugar and acid content but a higher mineral content than the others. The tannin content of the domestic varieties ranged from 0.011 to 0.017%. Requirements for juice production were: sugar/acid ratio below 40, good aroma, high juice yield. Among the most suitable varieties were: Canada, Champagne, Bauman's and Landsberg's Reinettes, Winesap and Kolačarka.

3794. KLEIN, L. G.

New apples promising for processing.

Fruit. Var. hort. Dig., 1953, 8: 3-4, illus.

Tests with the following three new apple varieties have given very promising results at Geneva, N.Y.: Monroe, Webster, Idared. The characteristics and merits of these varieties are discussed.

3795. ISAEV, S. I.

New summer apple varieties. [Russian.]

Sad i Ogorod, 1953, No. 6, pp. 8-13, illus.

A description is given of 9 early apple varieties developed at the Mičurin Horticultural Institute since 1933. Two of the new varieties are illustrated in colour.

3796. BOULAY, H.

Production et commercialisation de la pomme "Coquette" dans les Pyrénées-Orientales. (Cultivation and marketing of the Coquette apple in the Eastern Pyrenees.)

Pomol. franç., 1953, 80: 63-70.

Notes are given on the Coquette (Blanc d'Espagne) apple, a vigorous dessert variety, which matures between November and February-March and grows under the same conditions as Reinette du Canada.

3797. MINISTÈRE DE L'AGRICULTURE, BRUXELLES.
Variétés de pommiers et de poiriers pour la plantation et le greffage. (Apple and pear varieties for planting and top grafting) and Distances de plantation à conseiller en culture intensive basse-tige. (Planting distances for bush trees.)

[Publ.] *Minist. Agric.*, Bruxelles, 1953, pp. 8.

Apple and pear varieties for planting and top grafting in Belgium: vigour, flowering season, pollen and fruiting qualities, harvesting date, storage period and training method for 18 apple and 20 pear varieties. Recommendations are made for planting distances for various forms of intensive cultivation.

3798. ANJOU, K.

Päronodlingen och dess sortfrågor. (Pear growing and the variety problem.)

[English summary 9 lines.]

Sver. pomol. Fören. Årsskr. 1952, 1953, 53: 52-63, bibl. 13, illus.

The late maturity of the best pear varieties and their susceptibility to winter injury are the factors limiting pear growing in Sweden at present. Breeding work at Balsgård and the search for hardy rootstocks aim at overcoming these difficulties.

3799. MONIN, A.

Évolution de la valeur commerciale de quelques variétés fruitières. (Changes in commercial value of some fruit varieties throughout the season.)

Fruit belge, 1953, 21: 92-5.

Notes and graphs are given indicating the commercial value of the pears Doyenné du Comice, Durendeu, Conférence and Legipont throughout the marketing season.

3800. TRUSCOTT, J. H. L.

The Russet Bartlett pear.

From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

The Russet Bartlett is compared with the ordinary Bartlett. The former is recommended as a high quality fruit with distinctive appearance. It can be gas-stored successfully and the ripe Russet skin does not readily show handling marks.

3801. GERRITSEN, C. J.

Welke kersen moeten we planten? (Which cherries should we plant?)

Meded. Inst. Vered. Tuinbouwgew. 48, 1953, pp. 11.

Notes are given on the economic value of 23 cherry varieties grown in Holland, together with a graph showing the relative amounts of each variety grown in 1947/48 and 1951/52, and indicating which varieties are suitable for further planting.

3802. ZWEEDE, A. K.

Welke eisen worden aan de kersenrassen gesteld voor de verschillende producten als jam, sap e.d. en in welke hoeveelheden (verhouding) worden deze verwerkt? (What cherry varieties are required for various products such as jam and juice, and in what proportions are they processed?) [English summary 3 p.]

Meded. Inst. Vered. Tuinbouwgew. 50, 1953, pp. 26-31.

From 1947 to 1950 in Holland the percentage of cherries used for processing varied between 20 and 25. The most important variety for jam making is the May cherry which should be bright red and picked just ripe. For juice manufacture only cherries of prime quality are used and the juice must have a minimum specific gravity of 1.05. Varieties of *P. cerasus* have too much acidity, whereas those of *P. avium* have too little; diluted juice of May cherries is often preferred to the pure juice. The best wine is derived from varieties with a fairly high acid content; in addition to May cherry, Westerleese Kriek and Morello, the varieties Rode Waalse, Früheste der Mark and Elton will probably prove satisfactory. For preserving, firm-fleshed varieties such as Bigarreau, Napoleon and Kentish Zwarte are best, and they should be picked underripe. For canning and bottling May cherry and Follower are outstanding, while Varikse Zwarte is suitable for dry quick freezing.

3803. G.M.K.

The Meteor cherry.

Fruit. Var. hort. Dig., 1953, 8: 11, illus.

In December, 1952, the Minnesota Agricultural Experiment Station introduced the Meteor red tart cherry, a cross between Montmorency and an unnamed, very hardy, small-fruited cherry from Canada. The fruit and the tree of the new variety are described.

3804. MORETTINI, A.

L'Amarena di Pescara, la sue selezione, la caratteristiche della razza e la coltura industriale. (The Pescara Amarena cherry, its selection, characters and commercial cultivation.) [English summary 8 lines.] *Riv. Ortoflorofruttic. ital.*, 1953, 37: 115-28, illus.

The Amarena di Pescara is a high quality sour cherry of the Chieti district, very similar to the Zara variety from which maraschino is made.

3805. HESSE, C. O., AND THOMPSON, L. A.

Ten peaches and a nectarine for the Western States.

Circ. U.S. Dep. Agric. 885, 1951, pp. 34, illus. [received 1953].

A description is given of varieties named after 1940 and their place in the California peach and nectarine industry is summarized.

3806. HESSE, C. O.

Burmosa and Redheart, two new plum varieties.

Bull. Calif. agric. Exp. Stat. 735, [1952?], pp. 15, illus.

Detailed practical and horticultural descriptions are given of 2 new plum varieties raised at Davis and released for trial by growers. Burmosa (Burbank × Formosa) is a self-sterile, early maturing plum and may be a substitute for Beauty; in external colour it resembles Becky Smith, while in flavour and flesh colour it resembles Formosa. Redheart (Duarte × Wickson) ripens a little later than Santa Rosa and about the same time as Duarte. It is excellent for cross-pollination with Elephant Heart, both varieties benefiting, and has shown no obvious weaknesses to date.

3807. GOOR, A., AND RAPPAPORT, Z.

Local varieties of plums in Palestine.

[Hebrew.]

(Publ.) *Minist. Agric. Israel*, 1949, pp. 21, bibl. 5, illus. [received 1953].

Varieties of *Prunus domestica*, *P. insititia*, *P. cerasifera* and *P. carasia* are described. [Summary in English provided by A. Goor.]

3808. VARENCOV, I. I.

Quince—a valuable fruit for the preserving industry. [Russian.]

Sad i Ogorod, 1953, No. 8, pp. 15-16.

Of a total of 86 varieties and types of quince tested at various points in the U.S.S.R., those most suitable for preservation are listed.

Propagation and rootstocks.

(See also 3766, 3834, 3891a, h, 4074, 4472.)

3809. MAURER, K. J.

Über das Pikieren vor der Aussaat. (On pricking out before sowing.)

Saatgut-Wirtsch., 1953, 5: 178-9.

Maurer describes Russian experiments on the pre-treatment of pome and stone fruit seed, which induces branching of the root and thus dispenses with the hazardous practice of pricking out. For an abstract on I. G. Lurje's method see *H.A.*, 23: 2540. S. Zaliwski's technique [*Przegl. Orgnodn.*, 1953, No. 2, pp. 1-3] is even less laborious; it consists in rubbing off the short roots of germinated seed on a sieve. A table is reproduced of Zaliwski's results obtained by treating Antonovka and *Prunus divaricata* seed in this manner. Maurer adds that at Geisenheim the cutting back of roots on germinated walnuts has become standard practice and that experiments with pome and stone fruit seed on these lines are to be initiated.

3810. HOCHAPFEL, H.

Hinweise auf Fehlerquellen bei der Keimprüfung von Obstsamerien mit Tetrazolium (TTC). (Sources of error in the testing of fruit seed with tetrazolium.)

Dtsch. Baumsch., 1953, 5: 224-8, 230, bibl. 1, illus.

Erroneous conclusions may be drawn from results obtained in the testing of fruit seed by the tetrazolium method as applied by Karnatz [*H.A.*, 22: 2154] and others. An improved method has been developed at the Inst. f. Obstbau, biol. Bundesanst. Heidelberg.

3811. QUEENSLAND DEPARTMENT OF AGRICULTURE, HORTICULTURE BRANCH.

Propagation of fruit trees.

Qd agric. J., 1953, 76: 203-19, illus.

This general paper includes notes on propagation by shield-, patch-, and window-budding, and on grafting by the following methods: whip-and-tongue, bark graft, side-wedge, cleft (apple and grape vine), side-cleft (custard apple), strap (commonly used for reworking deciduous trees at Stanthorpe), root grafting (apples), inarching and bridging.

3812. NICOLIN, P.

Der "Frauweiler Zapfen". (The "Frauweiler snag".)

Dtsch. Baumsch., 1953, 5: 188, illus.

At his nursery at Frauweiler, Germany, the author cuts a deep wedge out of the rootstock just above the scion bud and then removes the top of the stock with a long, upward, slanting cut. What remains is left as the snag. The advantages claimed for this treatment are: More vigorous and straighter growth of the scion, which requires tying with paper-covered wire only; easier removal of the snag; a better union and a better stem. The technique is clearly illustrated in comparison with the normal and the snagless method of tree raising.

3813. NICOLIN, P.

Das "Nicolieren", eine neue Veredlungsmethode. ("Nicolieren", a new budding method.)

Dtsch. Baumsch., 1953, 5: 186-7, illus.

"Nicolieren", as the author terms his technique of double working pear trees for which he has sought patent protection, is very similar to Garner's "double-shield budding" developed independently at East Malling [*H.A.*, 23: 2548]. Nicolin reports a successful test with 20 quince rootstocks that were budded with Clapp's Flavourite and Williams, with two other varieties as intermediates. The method used is clearly illustrated. It is suggested that this time-saving technique of double-working could be applied also to plums and apples, in the latter case with a view to combining, for instance, the beneficial effects of EM. II and IX in a single tree.

3814. SCHULZ, F.

Über Doppelveredlungen bei Obstgehölzen. (The double working of fruit trees.)

Dtsch. Baumsch., 1953, 5: 216-19, bibl. 3, illus.

In February/March, 1941, 2-year-old, transplanted EM. XVI rootstocks (8-10 mm. in diameter) and seedlings of an apple variety (7-9 mm.) were bench-grafted with Boskoop and Berlepsch, scions of other EM. clones and varieties being inserted as intermediate stocks in one operation. The take was very satisfactory, but in the first year growth was less vigorous than that of plants raised in the usual manner. The experiment was repeated in 1949 with similar results. Data are tabulated on the annual growth made in the first two seasons of both trial periods. The author concludes from his observations that the double-working of rootstocks by bench-grafting is a suitable method for experimental purposes, but that the technique would be uneconomic commercially.—Inst. f. Obstbau, Berlin-Dahlem.

3815. PRIOL, J.

Ponašanje deblotvoraca jabuka u rastilu. (The development of apple stem builders in the nursery.) [English summary 1½ p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 3-25, bibl. 37, illus.

The results of a preliminary series of experiments on stem builders grafted on seedling rootstocks at the Fruit Research Institute, Maribor, Slovenia, are given. Four native and 8 Russian apple varieties were tested, of which the 4 native and 4 of the Russian varieties (including 3 Mičurin's hybrids) were found satisfactory. The most suitable scion varieties for each of the satisfactory stem builders are listed. All the intermediate stocks proved resistant to apple canker (*Nectria galligena*) and woolly aphid (*Eriosoma lanigerum*), and

partially resistant to mildew (*Podosphaera leucotricha*), but apple scab (*Venturia inaequalis*) was widespread. Mild winters prevented examination of winter hardiness.

3816. DOSTÁLEK, J.

Rozmnožování ovocných dřevin kořenovými řízků. (The propagation of fruit trees by root cuttings.) [Russian and German summaries ½ p. each.]

Sborn. čsl. Akad. zeměd. Věd, 1953, 26: 53-66, bibl. 24, illus.

In trials in Průhonice in 1951 root cuttings of the following rootstocks and varieties rooted best: EM. IX, apple seedling, wild apple, wild pear, and the plum varieties Marunka, Maevazinka and Dolanka. Root cuttings should be taken from young plants, and should be 10 cm. long and 5-10 mm. in diameter. Most satisfactory results were obtained with cuttings planted slightly obliquely. The basal end of some of the cuttings was inserted into a growth stimulator consisting of 50 mg. NAA, 100 mg. nicotinic acid, 50 cc. ethanol (96%) and 50 cc. distilled water, resulting in improved rooting and, in the case of Dolanka, in much better quality plants.

3817. DIKSHIT, N. N.

Studies in the propagation of plum, horti. variety Kelsey (*Prunus salicina* Lindl.), by stem cuttings.

Sci. and Cult., 1953, 18: 496, bibl. 1.

In an earlier experiment [*H.A.*, 23: 2546] the percentage of rooting in cuttings from dormant shoots of Kelsey plum did not exceed 22 following treatment with 30 p.p.m. indolebutyric acid. A higher concentration of this acid (30-40 p.p.m.) and a solution of 10 p.p.m. naphthaleneacetic acid gave slightly better results.—Govt. Fruit Res. Stat., Saharanpur, U.P.

3818. U.S. DEPARTMENT OF AGRICULTURE.

Rootstock problems.

Rep. agric. Exp. Stats, U.S., 1952, 1953, p. 34.

A definite incompatibility was found to exist in Indiana between Golden Delicious scions and Virginia Crab rootstocks. Observations in an 11-year-old dwarf apple orchard showed EM. I to be a promising rootstock for several varieties. To date, trees on this stock have produced twice the amount of fruit obtained in a comparable orchard on commercial seedling rootstocks. In South Dakota, Dolgo and Hibernial on Siberian Crab rootstocks were found to be the most suitable hardy framework stocks for top-working apple trees. As a means of reducing fire-blight damage to cultivated pears, the Ohio station has successfully used the resistant Old Home pear as framework.

3819. SCHULZ, F., KIRCHHOFF, R.-H., AND THIELE, I.

Tastversuche zur Grundlagenforschung im Obstbau: I. Die Wandlung der Baumleistung durch operative Massnahmen insbesondere durch die Fruchtbrücke. II. Über Austauschversuche insbesondere unter Verwendung von Edelsorten als Unterlagen. III. Über die Prüfung der Unterlagenbe-

* Formerly *Sborn. čsl. Akad. Zeměd.* [then Agriculture, now Agricultural Science].

einflussung an der Edelsorte. (Tentative basic research in fruit growing. I. Changes in vigour induced by surgical measures, with special reference to the "fruiting" bridge. II. The use of scion varieties as rootstocks. III. Testing the scion influence upon the rootstock.)

Festschr. tech. Univ. Berlin-Charlott., Abt. Gartenb., 1953, pp. 87-95, illus.; pp. 96-102, bibl. 4, illus.; pp. 103-9, illus.

I. The "fruiting bridge" (Schulz, F.). The insertion of a so-called "fruiting bridge", the technique of which is described, has the effect of reducing the vigour of a tree more permanently than girdling, root pruning or similar treatment. A ring of bark, at least 10 cm. wide, is removed from the stem, and EM. II or IX scions of corresponding length are grafted vertically across the ring, having been so prepared that the cambium of the scions lies flush against the cambium of the stem and the tapered ends can be slipped under the bark. The operation is carried out in stages so that only freshly cut surfaces will come into contact. The scions are grafted as close to each other as possible, and in the second season the bark is removed from the areas where they touch to promote their complete fusion. With some apple trees the data on the effect of the "fruiting bridge" cover a period of 10 years and it has been shown that the influence is permanent. Yields were much higher than those of the controls, in spite of the smaller size of the head. Three years' observations on pears suggest that quince, where compatible, is effective as a "fruiting bridge". The new technique has already proved a useful aid in physiological rootstock research. Photographs illustrate the bridge in all its stages as well as comparable treated and untreated trees. II. *The use of scion varieties as rootstocks* (Kirchhoff, R.-H.). In the absence of a sufficient number of apple trees on their own roots preliminary trials were carried out with black, red and white currant varieties in the course of which many combinations were produced by bench grafting. Comparative data are presented for 4- to 5-year-old bushes on the growth rate of 6 scion varieties when worked on their own roots and on several other varieties. In one case only highest yields coincided with largest size of the bush (unworked). Two varieties cropped best when worked on their own roots, and three others when grafted on other varieties. The least vigorous combinations always yielded the largest crops in relation to plant size. III. *Testing the scion influence upon the rootstock*. Four further years of observation on an apple spindle bush plantation confirmed Kemmer's earlier conclusion that it is the scion variety which largely determines the tree's reaction to grassing down [*H.A.*, 19: 877]. The influence of the varieties Oldenburg, Berlepsch and Laxton's Superb was so strong that they thrived under grass on EM. IX, although this rootstock reacted unfavourably to cultivation under grass in combination with many other varieties.—*Inst. f. Obstbau*.

3820. KEMMER, E.
Einfluss der Unterlage auf die Fruchtform.
(Rootstock influence on fruit shape.)
Reprinted from *Dtsch. Obstb.*, 1953, 72 (1): 12-13, illus.

In spring, 1950, scions of 9 pear varieties were grafted onto a 14-year-old, bearing Belle de Boskoop apple tree. Seven varieties cropped well in 1952, but the fruits were more or less spherical. The illustrations show a very pronounced influence of the rootstock on fruit shape, at least in the first crop [effect on flavour not stated].

3821. KARNATZ, H.
Grahms Jubiläum und Kirchensaller Mostbirne sind die verbreitetsten Unterlagen im Bundesgebiet. (Graham's Jubilee and Kirchensaller Mostbirne are the most widely used rootstocks in Western Germany.)
Mitt. ObstbVersuchsrings Jork, 1953, 8: 121-2.

Of all apples worked on seedling rootstocks in Western Germany 49% are worked on Graham's Jubilee seedlings, while Kirchensaller Mostbirne makes up 81% of all pear seedling rootstocks. Statistics of stone fruit rootstocks and of other pome fruit rootstocks are also discussed. The article is based on a paper in *Statistische Berichte*, 1953, Heft 4.

3822. DAY, L. H.
Rootstocks for stone fruits.
Bull. Calif. agric. Exp. Stat. 736, 1953, pp. 76, bibl. 55, illus.

This bulletin summarizes 30 years' observations and experiments on the behaviour of myrobalan and other plum, peach, apricot and almond rootstocks with various stone fruit varieties, and on their response to the fundamental factors of climate, soil, diseases and pests.

Pollination.

3823. HARRIS, W. B.
Fruit tree pollination.
J. Dep. Agric. S. Aust., 1953, 56: 507-13.
The author shows in graphic form the flowering period in Australia of commonly grown varieties of apple, pear, almond, cherry and European and Japanese plums. Based on data afforded by growers in 1936, 1937, and 1938 the information should be useful in planning new or adjusting old plantings.
3824. Pozzi, A.
Un metodo rapido per la determinazione della quantità di polline prodotta dalle razze di fruttiferi. (A rapid method of determining the amount of pollen produced by fruit tree varieties.) [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1953, 37: 129-33, bibl. 29, illus.
- Oberle and Goertzen's method [see *H.A.*, 23: 178] was successfully employed with several varieties of vine, peach, cherry, plum, and apple.—*Ist. Colt. arbor. Univ. Firenze*.
3825. BEVILACQUA, I.
Osservazioni ed indagini sulla autosterilità del ciliegio in provincia di Modena. (Research on self-sterility in cherry in Modena province.)
[*Publ. Isp. prov. Agric., Modena*, [1953?], pp. 253, bibl. 7, illus.

The results are given of a 4-year study on the chief

varieties in an important cherry-growing district in the Province of Modena to determine self-sterility and inter-compatibility. The varieties concerned were Mora di Vignola, Durone Nero I, II and III, Durone d'Anella and Durone della Marca; the sour cherry was also studied. Tables show flowering dates, pollen germinating capacity and the percentage fruit set of the different varieties when self-pollinated, open-pollinated and cross-pollinated with each of the others. The conclusions were that (1) all are self-sterile except the sour cherry, which nevertheless benefits from cross pollination; (2) differences in flowering date are small and do not prevent some degree of cross-pollination; (3) pollen germinating capacity is high. Inter-compatibility lists are given. It is recommended that 15% of the trees in an orchard should be a pollinating variety.

3826. STANKOVIĆ, D.

Prilog proučavanju odnosa oplodjavanja krušaka. (A contribution to the study of pollination and setting of pears.) [English summary ½ p.]

Arh. poljopr. Nauk, Belgrade, 1952, 5 (8): 149-56, bibl. 12.

Pollinators are recommended for the pear varieties Duchesse d'Angoulême, Triomphe de Vienne, Curé, Hardy, Bartlett and Diels, grown in Serbia. Conditions for satisfactory pollination and good fruit set are outlined.

3827. SCHANDERL, H.

Über Pollenspender für Ruth Gerstetter und die Schlehe als fakultativer Pollenspender für Kulturpflaumen. (On pollinators for Ruth Gerstetter and the sloe as a potential pollinator for cultivated plums.)

Dtsch. Obstb., 1952, 71: 98.

In several years' trials the plum variety Ruth Gerstetter was found to be self-sterile. Varieties are named that were shown to pollinate it, but the best results were obtained with sloes, especially those with 48 chromosomes. In the past, the presence of sloes may have led to mistaken conclusions by those observing the pollination of plums. O.J.

3828. CYGANKOV, S. K.

Pollination by bees increases yield and quality of fruit. [Russian.]

Sad i Ogorod, 1953, No. 5, pp. 9-11.

In an experiment with the apple variety Boiken, branches of trees screened during blossom time produced practically no fruit, whereas an open-pollinated tree situated about 1,000 m. from a beehive produced apples of 87.6 g. average weight and 12.59% sugar content and a similar tree, together with 10 flowering branches of a pollinator and a bee colony, under a muslin cover bore fruit of 119.8 g. average weight and 14.25% sugar content. In further trials with 6 fruit species it is shown that with self-pollination 0 to 1.5% of the total blossom produced fruit, but when bees were present the percentage ranged from 14 to 17.

3829. GRIGGS, W. H., VANSSELL, G. H., AND IWAKIRI, B. T.

Pollen storage.

Calif. Agric., 1953, 7 (7): 12.

Many samples of hand-collected and bee-collected pollen of temperate stone and pome fruits and olive

have been stored successfully from one season to the next in an ordinary household refrigerator at about 0° F. A table gives the percentage germination for different varieties at collection and after storage.

3830. BEUTLER, R.

Nectar.

Bee World, 1953, 34: 106-16, 128-36, 156-62, bibl. 136, illus.

After introductory notes on the nectary and the composition of nectar this review article discusses the factors affecting the quantity and composition of nectar. These are: plant characters—size of nectary, position of flower on plant, diameter of shoot, sex, variety, age of flower; and external influences—air humidity, soil moisture, thunderstorms and wind, soil conditions, temperature, light, time of year, and parasites. Finally, methods of studying nectar are reviewed. —Zool. Inst. Univ. Munich, Germany.

Growth phenomena.

(See also 3968.)

3831. MICKLEM, T.

Fruit bud differentiation and development in deciduous fruit.

Dec. Fruit Gr., 1953, 3 (2): 12-14, bibl. 3.

Dates are given of the fruit bud differentiation of apples, apricots, peaches, pears and plums as noted by research workers in Australia and S. Africa.

3832. SWARBRICK, T., AND LUCKWILL, L. C.

Fruit culture. The factors governing fruit-bud formation.

Science and Fruit, 1953, pp. 99-109, bibl. 24.

Getting trees to bear early and to bear regularly depends fundamentally on the formation of fruit buds. How the determination of the many different factors involved has been studied for the last forty years at Long Ashton is described under the following heads: Vegetative vigour and fruit-bud formation; development of the dwarf pyramid tree; internal condition of the tree; carbohydrate/nitrogen ratio; and development of practical methods of controlling fruit bud formation. The last has entailed investigations on biennial bearing, tree shaping and rootstock and grass effects. While the ultimate nature of the physiological processes involved in fruit bud formation still eludes us, the work discussed has had a favourable effect on fruit-growing generally, notably in the development of the dwarf pyramid and delayed open centre types of tree, in Lee's method of crop forecasting, the use of grass in orchards and the renewal system of pruning.

3833. PEARSON, J. A., AND ROBERTSON, R. N.

The physiology of growth in apple fruits.

IV. Seasonal variation in cell size, nitrogen metabolism, and respiration in developing Granny Smith apple fruits.

Aust. J. biol. Sci.,* 1953, 6: 1-20, bibl. 11.

Results of investigation of cell size, fruit size, nitrogen metabolism, and respiration rate over three successive seasons confirm the main conclusions of earlier papers in this series [see *H.A.*, 22: 2174, 2175, and 23: 169].

* Formerly *Aust. J. sci. Res., Ser. B, biol. Sci.*

Fruit left on the trees for a period beyond normal commercial maturity showed a very large increase in soluble nitrogen with only slight increase in protein nitrogen. The relation of the nitrogen and organic acid metabolism to the climacteric rise in respiration is discussed. [Authors' summary.]

3834. OLDÉN, E. J.
Utvecklingsstadierna hos äpplefröplantor.
(Developmental stages of apple seedlings.)
[English summary $\frac{1}{2}$ p.]
Sver. pomol. Fören. Årsskr. 1952, 1953,
130-6, bibl. 11, illus.

Following a discussion of the literature, a brief account is given of the author's own experiments at Balsgård. In 1946, buds from 6- to 13-year-old seedling apple trees, that had fruited several times, were taken (a) from crown shoots ("adult" stage) and (b) from shoots issuing from the base of the stem ("juvenile" stage) and were budded onto EM. IV. Trees worked with (a)-buds flowered for the first time in 1948, and those from (b)-buds in 1952. In 1951 (a)- and (b)-buds from the same seedlings were worked on EM. IX; the resulting maiden trees showed an "adult" and "juvenile" character respectively. Cuttings taken from the "adult" part of the seedling tree did not form any roots, whereas cuttings from the "juvenile" part rooted readily in the first year.

3835. DE HAAS, [P. G.].
Hat das Klima in der Obstbaumschule einen Einfluss auf die Weiterentwicklung der Gehölze am späteren Standort? (Does the climate in the nursery influence the later development of a fruit tree in the orchard?)
[English summary 6 lines.]
Mitt. Klosterneuburg, 1953, 3: 135-40.

Extreme conditions may adversely affect growth; otherwise no!

3836. UPSHALL, W. H.
The permanence of size differences in Kieffer pear trees.
From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

Kieffer pear trees on seedling roots which were large at planting time are, after 16 years, still in the same category but not significantly larger than trees which were small at planting time. Yield estimates on a per-tree basis indicate that the trees in the "large" category at planting time have been slightly more productive.—Vineland, Ont.

3837. SCHNELLE, F.
Beiträge zur Phänologie Deutschlands.
III. 6 Mittelwertskarten (1936 bis 1944)
Vorfrühling bis Herbst. (Contributions to the phenology of Germany. III. 6 maps giving mean dates from early spring to autumn, 1936-44.)
Ber. dtsh. Wetterdienst., 1953, No. 1, pp. 8, bibl. 12-6 maps.

One map illustrates the mean dates of the beginning of apple blossoming in Germany calculated for 12 medium-early varieties.

3838. PROEBSTING, E. L., Jr.
Leaf analysis and growth of Montmorency cherry trees (*Prunus cerasus* L.) as influenced by solar radiation and intensity of nutrition.
Diss. Abstr., 1953, 13: 148-9, Publ. 4709 of 87 pages.

One-year-old Montmorency cherry trees were grown in sand culture with 5 balanced nutrition solutions ranging in concentration from 0 to 8,000 p.p.m. Varying conditions of solar radiation were provided by moving the trees between full sun and shade houses. Leaf analysis values for the individual elements did not increase proportionately with the concentration of the nutrient solution. Marked differences in the leaf analysis were induced by differences in solar radiation; they were of complex nature and were influenced by other factors, such as temperature. Conditions most favourable for terminal growth were moderate temperatures and low light intensities. Increase in dry weight was the greatest with warm temperatures and full sunlight. High concentrations of nutrient solutions were more toxic at high temperatures and reduced solar radiation.—Mich. St. Coll.

3839. JACOBONI, N.
Ferite e cerini cicatriziali delle piante.
(Wounds and callus tissue in plants.)
Ital. agric., 1953, 90: 383-93, bibl. 15, illus.

Some examples are given of the formation of callus tissue in olive, apple, vine and cherry. The olive does not heal quickly but does so more rapidly when young; its rate of healing is related to water supply.

Fertilizers, soil management and irrigation.
(See also 3751, 3891b.)

3840. U.S. DEPARTMENT OF AGRICULTURE.
New leads on nutrition of fruit plants.
Rep. agric. Exp. Stats U.S., 1952, 1953, pp. 32-3.

At the New Hampshire station apple trees mulched for 11 years without any additional N produced 150 bushels more fruit per acre than trees receiving only commercial fertilizer. Successful production of peaches growing under sod is possible, according to the Ohio station, if an adequate amount of N is supplied to the soil. Greatly increased crops of ever-bearing strawberries were obtained in Iowa by a combination of summer mulching and runner removal. Contrary to unfavourable reports from growers, the Delaware station found that poultry manure can be effectively utilized in strawberry production provided it is applied in the autumn before the plants are set.

3841. JOHANSSON, E., LUNDSTEDT, H., AND BERGELIN, E.
Gödslingsförsök med äpple vid Ekerum och Ugerup 1941-1951. (Manurial trials with apples at Ekerum and Ugerup, 1941-51.)
[English summary 1 $\frac{1}{2}$ p.]
Medd. Trädgårdsförs. Malmö 78, 1953, pp. 20, illus.

Manurial trials were carried out in sandy soil with Cox's Orange and Gravenstein on EM. I, IV and XVI at Ekerum (on the Island of Öland) and on EM. II, IV and XVI at Ugerup (in southern Sweden). The following

treatments were applied: (a) Control; (b) N; (c) N+P; (d) N+K; (e) N+P+K (1:2:5:3); (f) stable manure +NPK to maintain the 1:2:5:3 ratio. The results, which so far have not shown any appreciable response to P, suggest that the following provisional formula would be satisfactory: 2 kg. stable manure per m² every third year, with 5 kg. sulphate of ammonia and 3 kg. 40% muriate of potash per 100 m² in each of the two intervening years. Fruit colour was most pronounced in (a) and keeping quality was better in fruit from (a) and (d) than from (b) or (c). Data on stem diameter, height, yield, etc., are tabulated for the various treatments at the two places. The experiment is being continued.

3842. BEATTIE, J. M.

A summary of three years' work with foliage applications of urea.

Proc. Ohio St. hort. Soc., 1952, pp. 86-91, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17620.

Experiments were conducted with foliage applications of urea to Jonathan and Rome Beauty apple trees to determine the feasibility of substituting this method for conventional soil application of N. Urea was applied in 3 sprays commencing at petal fall at a rate equivalent to normal soil applications of N. With Rome Beauty terminal growth, leaf colour, leaf N and yields were comparable to those in trees receiving soil applications of N. With Jonathan, yields and terminal growth were reduced significantly following the use of urea. Urea sprays on Rome Beauty were as effective as soil applications in bringing about recovery of vigour and productivity of trees unfertilized with N the previous season.

3843. OSMOND, D. A.

Surveys of fruit soils.

Science and Fruit, 1953, pp. 131-9, bibl. 8, illus.

The share of Long Ashton in the soil survey work in the West Midlands is described and many of the interesting results are discussed. Such surveys are found to have provided a solid basis for advising on the suitability of soils for the growing of different classes and even different varieties of fruit and they enable forecasts to be made of the main problems likely to occur on the various soil groups.

3844. GOODMAN, R. N.

Influence of organic mulches on reaction and exchangeable calcium content of soil.

Soil Sci., 1953, 75: 459-66, bibl. 9, being *Pap. J. Ser. Mo. agric. Exp. Stat.* 1320.

After an extended period of mulching apple trees with hay and straw, a differential effect upon the orchard soil with respect to pH and exchangeable calcium was noted. Where hay mulches had been applied a significant decrease in the hydrogen-ion concentration was observed, especially in the surface 2 inches of the profile. In addition, the application of hay mulches caused removal of rather large quantities of calcium from the upper 12 inches of the soil; this effect was most pronounced in the 0-2 inch level. Although the data provide only indirect evidence of increased microbial activity within the hay mulch, a more rapid decrease in total organic material, loss of sugars and starch, and

greater resynthesis of proteinaceous materials and hemicellulose, it does not seem too illogical to assume that under the hay-mulch conditions, nitric and carbonic acids or some other products of plant material decomposition are formed in sufficient quantity to cause removal of appreciable amounts of exchangeable calcium from the surface regions of the soil profile. [Author's summary and conclusions.]

3845. RITTER, C. M.

The effects of soil cultural treatments on apple yields.

Proc. Ohio St. hort. Soc., 1952, pp. 83-5, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17626.

The purpose of the study was to investigate the N, carbohydrate and mineral element content of Stayman Winesap and Delicious apple trees. These trees were grown under clean cultivation and sod-mulch with and without N application since planting in 1915. Soil data showed that total N, organic matter, exchangeable Ca and K, and readily available B and P were highest in soil beneath the mulch. Nutrient levels in 8 portions of the trees were not significantly different between mulched and cultivated plots or between N fertilized and no N plots. Yields of both varieties were less where N was applied. This was reflected in more vigorous shoot growth with fewer flowers formed on trees receiving N. Failure to show yield increases as a result of N fertilizer is attributed to the excellent soil and site upon which the orchard is located.

3846. HILL, R. G., Jr.

Sod as a soil management practice for peaches.

Proc. Ohio St. hort. Soc., 1952, pp. 104-10, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17623.

The growth and yield responses of peach trees, variety Halehaven, grown under a sod system of soil management and receiving normal, twice normal, and 4 times normal N applications are compared to those of trees grown under the accepted soil management practice of cultivation with summer and winter cover crops plus the normal N application. The normal N application was taken as $\frac{1}{4}$ lb. of a 16% N carrier per year of tree age. Data were obtained relative to the increase in trunk circumference, shoot growth, leaf colour, leaf area, leaf N, yield, fruit colour and rainfall. On the basis of the results obtained it appears that the peach grown under sod can be expected to produce growth and yields comparable to that obtained under the presently accepted soil management practices, if there is sufficient soil moisture and the rate of N fertilization is doubled.

3847. PROEBSTING, E. L.

Orchard plow-pans.

Calif. Agric., 1953, 7 (6): 12-13.

A briefly described series of plough pan studies shows that tree root distribution can be markedly improved by soil management, and the effects of soil compaction by tillage equipment counteracted to a considerable extent. Cover-cropping and non-cultivation can bring rapid improvement. Clean cultivation need not cause plough pan if care is exercised as to the moisture content of the soil when it is worked. Leaf analyses

suggest that better root distribution enables the trees to absorb additional nutrients.

3848. WILCOX, J. C., MASON, J. L., AND MCDOUGALD, J. M.

Consumptive use of water in orchard soils.

II. Effects of evaporating power of air and of length of irrigation interval.*

Canad. J. agric. Sci., 1953, 33: 231-45, bibl. 15, being *Sci. Contr. Div. Hort.*, exp. *Fms Service Ottawa* 794.

The rate of consumptive use of water was determined to a depth of six feet in the soil in 41 plots of mature McIntosh apple trees in five districts. The major findings were as follows: (1) Considerable variation in rate of consumptive use was found to occur from point to point across the diagonal of a tree square. (2) Great variability in rate of consumptive use was encountered among the three locations used in each tree square. (3) A highly significant positive correlation was obtained between the rate of evaporation from an open water tank and the rate of consumptive use. (4) A significant negative correlation was obtained between the length of irrigation interval and the average daily rate of consumptive use. (5) The curve obtained by plotting the logarithm of the length of irrigation interval against the maximum rate of evaporation from the open tank during the season proved to be a straight line with a negative coefficient. The shorter the interval, the greater was the daily average of its greatest seasonal evaporation. (6) The maximum consumptive use during any one length of irrigation interval ranged from 0.435 in. per day with a 5-day interval to 0.153 in. per day with a 40-day interval. For some unknown reasons, these values are as high as those obtained for actual irrigation requirements. [From authors' abstract.]

3849. TILL, M. R.

Peach irrigation studies.

J. agric. S. Austr., 1953, 56: 451-2, bibl. 1.

Fruit measurements carried out during 2 growing seasons in Elberta peach orchards in the irrigated Murray Settlements showed that when irrigation was adequate the greatest increase in fruit volume took place in the last 2-3 weeks before harvesting.

3850. MORITA, Y., AND NISHIDA, T.

Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and tree growth. (6). The effects of soil moisture on the growth of peach seedlings and budded peach trees. [Japanese, with English summary.]

J. hort. Ass. Japan, 1953, 22: 6-8, bibl. 3, illus.

Young peach seedlings and grafted trees were grown in soils with 10, 20, 30, 40, 50 and 60% moisture content. There were hardly any differences in respect of wilting, leaf discoloration and curves of linear shoot growth, but grafted trees seemed to exhibit drought symptoms a little earlier than seedlings.

3851. LEVINE, G.

Sprinkler effect on soil structure.

Amer. Fruit Gr., 1953, 73 (6): 15, 44, illus.

Preliminary results are reported from Cornell Univer-

* For Part I see *H.A.*, 23: 2616.

sity: (1) A relationship was found to exist between pressure and nozzle size and the size of the drops produced. (2) Experiments, carried out with different types of equipment on 3 types of soil, showed that both the soil structure and infiltration capacity are seriously affected by irrigation with the larger drops. These decreased infiltration into heavy soil by 90% and into light soil by 50%, while smaller drops caused a decrease of only 30%, irrespective of the type of soil. The effect of the drops on the structure of the soil was similar to that recorded for infiltration. Attention is drawn to the undesirable influence on small fruit of excessive splashing resulting from large drops produced with sprinklers operated on the low pressure-large nozzle principle.

3852. PIJLS, F. W. G.

Enkele eigenaardigheden van de grond in verband met kunstmatige beregening. (Some properties of the soil in relation to sprinkler irrigation.)

Fruiteelt, 1953, 43: 500-3, illus.

Information is given to fruit growers on how to determine field capacity, the field capacity of various soil types, the amount of water to apply and the speed at which to apply it.

Spraying for cultural purposes.

(See also 3874, 4740.)

3853. SCHULZ, F.

Über die Regelung des Fruchtansatzes mittels Hormonspritzungen. (The regulation of fruit set by hormone sprays.)

Reprinted from *Dtsch. Obstb.*, 1953, 72: 11-12, illus.

Two proprietary hormone preparations were applied as post-blossom sprays on 17 May, 1952, at Berlin Dahlem to some Cox's Orange and Early McIntosh spindle bushes and to Croncels standard trees. The treatment did not produce the intended fruit thinning effect, nor did it improve fruit quality, except in the case of Early McIntosh. All trees suffered persistent injuries to the foliage. The experiments will be continued.—Inst. f. Obstbau, Berlin-Dahlem.

3854. ELLENWOOD, C. W.

Chemical thinning sprays.

Proc. Ohio St. hort. Soc., 1952, pp. 70-9, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17622.

This is a report of experimental work at the Ohio Station on the use of both caustic and hormone sprays for thinning apples. Relationship between weather conditions at the bloom period and effectiveness of chemicals is discussed. In years of very favourable pollination conditions a stronger concentration of chemicals is suggested than for average years. The use of the hormone type materials in concentrate sprayers is discouraged. Growers' results were in harmony with the experimental trials.

3855. MCKENZIE, D. W.

Influence of α -naphthaleneacetic acid on the pre-harvest drop of Jonathan apples. I. Effect of repeated applications on pre-harvest drop and fruit quality.

N.Z. J. Sci. Tech., Sect. A, 1953, 35: 45-52, bibl. 6, illus.

Ten-year-old Jonathan trees were sprayed with NAA at 10 p.p.m. about 3 weeks before the predicted harvest date. Spraying was repeated on half the treated trees 14 days later. Control trees were sprayed twice with tap water. The single application of NAA resulted in a saving of 13% of the crop over the succeeding 14 days. The second application reduced fruit drop for a further 8 days with a total saving of 26% of the crop. Treatment with NAA produced highly coloured fruit, increased fruit size slightly, and increased storage losses by 12 to 20% when fruit was held in an air-cooled store. Treated apples also softened at a faster rate than controls.

3856. MCKENZIE, D. W.

Influence of α -naphthaleneacetic acid on the pre-harvest drop of Jonathan apples. II. The effect of a single application on respiration rate of fruit during storage.
N.Z. J. Sci. Tech., Sect. A, 1953, 35: 53-7, bibl. 4, illus.

Jonathan apples from trees sprayed with NAA at 10 p.p.m. 2 weeks before harvest showed increases in respiration rates of 20-30% and reached the climacteric peak 6 days before controls when kept in air-cooled storage. The treated apples showed slightly more storage rot but less Jonathan-spot than the controls after 6 weeks' storage.

3857. MCKENZIE, D. W.

Influence of α -naphthaleneacetic acid on the pre-harvest drop of Jonathan apples. III. Note on the effect of a single application on respiration rate of fruit on the tree.
N.Z. J. Sci. Tech., Sect. A, 1953, 35: 58-62.

In a preliminary, small-scale study respiration rates of Jonathan apples fruits were compared on trees or parts of trees sprayed shortly before harvest with NAA at 10 p.p.m. with rates on trees or parts of trees sprayed with tap water. In both cases temperature proved the dominant factor controlling respiration and, despite careful shading, there was a correlation coefficient of 0.67 ± 0.15 between mean rate of respiration per day and maximum day temperature. NAA appeared partially to inhibit both abscission and evolution of CO_2 , this parallel trend lasting for 8 days after treatment. Thereafter control of abscission continued for another 4-5 days, but the respiration rate increased until it exceeded that of the controls.

3858. MARLE, G. S.

Bevordering van de kleur der vruchten door bespuiting met groeistofpreparaten. (Improving fruit colour by spraying with growth substances.)

Fruittelct, 1953, 43: 548-9, bibl. 1.

Experiments were carried out in Holland during 1952 to determine the effect of pre-harvest sprays of 2,4,5-T ester on the colouring of apples. Several formulations were used on several varieties. Golden Delicious and Glorie van Holland responded best, the response of other varieties being slight. Irrespective of treatment the poorly coloured fruit stored better than the well coloured. There was some indication that treatment with growth substances prevented the colouring in store of green fruit, but this point requires further investigation.

3859. FLIERMAN, J., AND NOOY, S.

Over het gebruik van 2-4-5-T ester op Zigeunerin. (The use of 2,4,5-T ester on Zigeunerin apples.)
Fruittelct, 1953, 43: 504.

In an experiment carried out by the Rijkstuinbouw-consultensschap, Hoorn, the ester of 2,4,5-T (Aaneetos) used at concentrations of 200, 400 or 600 c.c. per 1,000 l. water markedly increased the colouring of Zigeunerin apples. All concentrations, however, caused severe damage including the twisting of petioles, the yellowing and abscission of leaves, smaller fruits and the death of young shoots. In the following spring both leaf and flower buds failed to develop. When the spray was used by a grower at 180 c.c. per 1,000 l. the buds did not die but developed later than normal the following spring. When used at 125 c.c. per 1,000 l. the effect on fruit colouring was less marked and some petiole twisting and leaf abscission occurred.

3860. CRANE, J. C.

2,4,5-T on apricot.

Calif. Agric., 1953, 7 (8): 15, illus.

An account is given of the experimental spraying of apricots (Royal, Stewart and Derby varieties) with 2,4,5-T. The propylene glycol butyl ether ester was very toxic to fruit and foliage even at low concentrations. Concentrations of 100 p.p.m. of the ammonium and trialkylamine salts were not toxic and caused the effects described below when applied on a semi-commercial scale in 1952 shortly after the beginning of pit hardening. Maturity was advanced by 3-10 days according to variety. Fruit volume increases ranged from 9 to 20% and yield increases from 17 to 22%. Fruit drop was reduced by 10 to 30% (by concentrations of 50 p.p.m., time of application apparently not being critical). A red coloration developed in the fruit during maturation in one orchard. Splitting at the blossom end or along the suture sometimes occurred and affected 70% of the fruit in one instance. Tip-dieback of vigorous shoots also took place but is of little practical consequence. [See also *H.A.*, 23: 246.]

3861. BLOMMAERT, K. L. J.

Effect of growth-substance sprays on the ripening of peaches.

Fmg S. Afr., 1953, 28: 207-9, bibl. 4, illus.

The ripening effect of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) sprays applied at a concentration of 50 p.p.m. on Early Dawn, Peregrine and Elberta peaches at various intervals before harvest is described. By applying a 2,4,5-T spray at the correct stage before harvest, fruit of the above three varieties can be induced to ripen approximately a week earlier than usual. Such sprayed fruits attain normal size, colour well and have good flavour. Sprays applied too early before harvest give rise to fruits of small size, often malformed and of poor quality. The use of 2,4,5-T sprays on peaches cannot be recommended until possible hold-over effects on the tree and the effect on keeping quality of fruit shipped in cold storage have been determined. Timing of the spray application and the use of the correct concentration of the growth substance are highly important and require further investigation. Spreading the harvest period and earlier marketing of fruit are possible advantages connected with the use

of 2,4,5-T sprays. [Author's summary.]—W. Prov. Fruit Res. Stat.

Composition of fruit.

(See also 3707, 3884.)

3862. COETZEE, W. H. K., AND BURGER, I. J.
The nutritive and health values of fresh fruit and fruit juices.

Dec. Fruit Gr., 1953, 3 (2): 5-6.

In tabular form are shown the contents per lb. of the fruits of apples, apricots, grapes, guavas, oranges, peaches (yellow), pears and plums in energy-giving and body building constituents, viz. calories, water, protein, carbohydrate, fat, ash, calcium, phosphorus and iron, and in protective constituents, viz. vitamins C, A, B₁, B₂, and nicotinic acid. In addition the author notes that other vitamins such as K, H (biotin) and P (citric) occur in fruits and add to their value, and that fruits are also valuable for the appetizing qualities contained in them of aroma and flavour and for their roughage and laxative qualities.

3863. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.

Sind Äpfel gute oder geringe Vitamin C-Quellen? (Are apples a good source of vitamin C?)

Bundesanst. Qualitätsforsch. pflanzl. Erzeugn., Geisenheim, 1951-53, pp. 10-11, illus.

Of two popular apple varieties commanding the same market price in Germany, Ontario and Geheimrat Oldenburg, the former was found to have a vitamin C content 7 times higher than the latter. Experiments with children and guineapigs showed that the difference in nutritional value is even greater. The implications of these findings are briefly discussed.

3864. HAY, J. G., AND PRIDHAM, J. B.

Free xylose in fruits.

Nature, 1953, 172: 207, bibl. 3.

"An investigation of the carbohydrates present in the Victoria plum has revealed the presence of small amounts (ca. 0.1% fresh weight) of free xylose in the juice of ripe and immature fruits. . . Evidence has also been obtained of the existence of free xylose in other varieties of mature plum, damson and quince, and Dr. A. E. Flood and his colleagues [at East Malling] have detected it chromatographically in young apple and pear shoots, and in the leaves of potatoes."

3865. ŠTAMPAR, K.

Odnos šećera i refraktometarske vrijednosti kod voća. (The ratio between the quantity of sugar and the refractometric reading in fruits.) [French summary ½ p.]

Poljopr. Znanst. Smot., 1952, No. 13, pp. 155-68, bibl. 10.

At the University of Zagreb close correlation (0.921-0.981) was found in several fruit species between sugar contents and refractometer readings, but the ratio differed from species to species. Apples gave the highest ratio of sugar to refractometric reading followed in order by peaches, sweet cherries, plums, sour cherries and pears. Errors of estimation could be reduced by due attention to degree of maturity, variety and method of cultivation.

3866. HULME, A. C., AND ARTHINGTON, W.

The oxidation of quinic acid.

J. exp. Bot., 1953, 4: 129-35, bibl. 9.

Filter-paper chromatographs run at intervals in the course of the isolation and identification of quinic acid from young Worcester Pearmain apple fruits showed that at least 6 acids were present in the reaction liquid. One of these acids is shown to be citric acid, and the oxidation of citric acid is shown to account for two other acids resulting from the oxidation of quinic acid. After prolonged oxidation (by H₂O₂) of both quinic and citric acids one acid predominates. This is proved by isolation and characterization to be malonic acid. Evidence is produced which suggests that acetonedicarboxylic acid is an intermediate in the oxidation of citric acid (and, therefore, of quinic acid) to malonic acid. [From authors' summary.]—Ditton Lab., D.S.I.R.

3867. HULME, A. C.

A new hydroxy-acid in the peel of apple fruits.

Nature, 1953, 172: 346, bibl. 3.

The new acid has been identified provisionally as either β -OH-glutaric acid or citramalic acid.—Ditton Lab., D.S.I.R.

3868. CRNČEVIĆ, V.

A contribution to the study of the mechanical and chemical composition of pomegranates from the Montenegrin coastal region as raw material for the production of grenadine. [Serbian, with English summary 11 lines.] *Arh. poljopr. Nauk*, Belgrade, 1952, 5 (7): 46-53, bibl. 6.

The most suitable pomegranate variety for the production of grenadine was Dividiš, containing 12.7% invert sugar and 0.31% total acid.

Harvesting, grading and storage.

(See also 3764, 3856, 3898, 4741.)

3869. SIMPSON, M.

Fruit maturity studies.

From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

In the hope of evolving a useful test method for defining fruit maturity in the field, measurements were made on Bartlett pear, McIntosh and Duchess apple, Curlew plum and a seedling cherry at weekly intervals to about one week later than commercial harvest. The results are summarized as follows: Brix and specific gravity were found unsuitable as indicators of maturity. Yield of expressible juice and pH measurements showed slight promise as indexes of maturity, but further work was indicated. Evolved carbon dioxide was not considered a sufficiently useful test to warrant further trial. Foaming tendency of Bartlett pear juice had the advantage of being a simple test, and therefore applicable to field use. It was of sufficient interest to warrant further investigations. Viscosity of all juices changed in a marked manner as the season advanced. Maturity suitable for commercial harvest coincided with easily detected viscosity change in Bartlett pear, Duchess apple, Curlew plum and the seedling cherry. The viscosity test is considered quite

promising and further work will follow in 1953.—
Vineland, Ont.

3870. O., L.

Een nieuwe fruitsorteermachine: "De Greefa". (A new fruit grader: "The Greefa".)

Fruiteelt, 1953, 43: 537-8, illus.

A description is given of the design and performance of this new circular Dutch fruit grader, which has a throughput of 1,250-1,500 kg. an hour operated by 3 or 4 workers.

3871. ANON.

Continental grader driven by fruit.

Comm. Grower, 1953, No. 2998, p. 1249.

A Dutch grader requiring neither motor nor hand power and capable of sorting between 40 and 80 bushels of apples an hour is described. Sizes of from 1.75 to 3.1 in. are obtainable, with gradations of 0.2 in.

3872. HAWTHORNE, P. L.

Louisiana packs ripe peaches in cardboard containers.

Amer. Fruit Gr., 1953, 73 (8): 8-9.

Ventilated cardboard containers are described and illustrated for 80, 96 or 120 peaches, the first two for fruits 2½ to 3 in. in diameter, the 120 pack for 2½ to 2¾ in. fruits.

3873. WALLACE, T.

Some effects of orchard factors on the quality and storage properties of apples.

Science and Fruit, 1953, pp. 140-61, bibl. 30, illus.

The author summarizing almost a life study of factors affecting storage quality of apples, many examples of which are illustrated here, concludes much as follows: The results will serve to show the complex nature of the problems of quality and storage properties of apples. The various factors may all produce significant effects and may also interact. Some of them are within the control of the growers, others, particularly climatic factors, are not and their effects may have to be modified by orchard practice. The results also indicate certain precautions which should be taken in making comparisons of the storage properties of fruit. The investigations should be regarded as providing a survey of the main effects of orchard factors. There is still need for a more intensive examination of the various factors under a wide range of orchard conditions.

3874. U.S. DEPARTMENT OF AGRICULTURE.

Storage and handling.

Rep. agric. Exp. Stats U.S., 1952, 1953, pp. 34-5.

It was observed by the New York (Cornell) station that 2,4,5-TP, applied to prevent pre-harvest drop of apples, has a stimulating effect on respiration and ripening of the fruit. By adding 100 to 200 p.p.m. maleic hydrazide to the hormone spray the stimulus to ripening was reduced without decreasing the holding qualities of the fruits. Studies in Oregon showed that Anjou pears satisfactorily withstood a storage temperature of 28° F. inside the packed box.

3875. ANON.

The 1953 orchard cool store.

Fruit World, Melbourne, 1953, 54 (5): 9, 11, illus.

A modern type of orchard cool store designed for use by individual growers is described. The building has heavily joisted floor and ceiling, walls of insulated fibro cement sheeting, wooden floor and a corrugated iron or fibro cement sheet roof. The door is of the new jack-hinge level sill type. The fully automatic thermostatically controlled cooling equipment incorporates air-circulation fans and works either by diesel or electric power. The dimensions of the store are not given. Erection costs of an apple store are quoted as 25s. per case and of a pear store 30s. per case. Running costs are given as 3d. per case space per apple storage season of 9 months.

3876. MANDENO, J. L., AND PADFIELD, C. A. S.

Refrigerated gas storage of apples in New Zealand. I. Equipment and experimental procedure. II. Variety Jonathan. III. Variety Sturmer. IV. Variety Granny Smith.

N.Z. J. Sci. Tech., Sect. B, 1953, 34: 462-9, bibl. 13; 470-85, bibl. 6; 486-502; 503-14, bibl. 1.

I. Equipment and methods for gas storage of New Zealand apple varieties are described in detail as an introduction to the three papers which follow. In the experimental store were three small cool chambers, each equipped with eight gas-tight cabinets, through which various gas mixtures could be passed. When reactions of a variety had been determined in these cabinets, work was transferred to a larger store of two chambers, each capable of holding 500 bushels. II. Gas-storage trials with Jonathan apples were carried out over the years 1939 to 1944 inclusive. Brown-heart and a form of deep scald occurred when the concentration of CO₂ reached 8% or above, at temperatures exceeding 40° F. By storing Jonathan in a gas mixture of 7% CO₂, 14% O₂, and 79% N at a temperature of 40° to 41° F. with R.H. 90%, it was possible to extend the storage life until early September, an increase of two months over the storage life obtained under ordinary cool storage. III. Experimental and semi-commercial refrigerated gas storage trials of Sturmer Pippin apples between the years 1939 and 1947 are reported. Results from experiments in cabinets suggested that the most suitable conditions for gas storage of Sturmers were likely to be either 7.5% CO₂, 7.5% O₂, 85% N; or 5% CO₂, 5% O₂, 90% N, with a temperature of 40° F. and relative humidity of approximately 90%. Owing to gas leaks in the semi-commercial store, these conditions could not be reproduced under commercial conditions. In cabinet experiments, brown-heart, a respiratory disorder of apples, was for all practical purposes eliminated. In three semi-commercial trials, brownheart was the most serious disorder present. IV. Refrigerated gas storage of Granny Smith apples was carried out in small cabinets during the years 1941, 1947 and 1948. These experiments showed that maximum storage life for this variety was about 150 days. Limiting factors to long storage were core-flush and, to a lesser extent, superficial scald. None of the gas mixtures used gave satisfactory control of core-flush, but it seems probable that Granny Smith apples would keep better under gas storage than in normal cool stores. No single set of conditions gave outstanding results. Of combinations tested, the following appeared to be the most suitable: Temperature 37° to 39° F., relative

humidity 90%, atmosphere 3 to 6% CO₂ with 5 to 10% O. [From authors' summaries.]

3877. PEARSON, J. A., AND ROBERTSON, R. N.
The climacteric rise in respiration of fruit.
Aust. J. Sci., 1952, 15: 99-100, bibl. 4.

Fourteen samples of fruit were taken from a Granny Smith apple tree at weekly intervals from 134 to 239 days after blossom to measure the respiration of the whole fruit and of cut discs. The respiration of the cut tissue 6 weeks before the climacteric rise was about 4 times that of the same weight of tissue in the whole fruit. When the whole fruit went through its climacteric rise, the respiration rate per unit weight of cut tissue did not increase significantly. In the first sample, taken 7 weeks before the start of the climacteric rise, the addition of 2,4-dinitrophenol (DNP) doubled the oxygen uptake. In the next 7 weeks, and as the fruit went through the climacteric rise, the effect of DNP decreased progressively. The addition of adenosine triphosphate (ATP) increased the respiration rate by about 30% before the climacteric, while the effect of ATP after the climacteric rise was uncertain. The role of phosphate acceptors in respiration is discussed in relation to these findings. Interesting results were also obtained from the addition of 0.4 M. Na succinate to cell-free particles and may provide information on the nature of enzymic changes taking place during the respiratory changes in fruit tissue.—Div. of Food Preservation and Transport, C.S.I.R.O., Homebush, N.S.W.

3878. VICKERY, J. R., AND OTHERS.
The gas storage of apples and pears in Australia.
Proc. 8th int. Congr. Refrig., Lond., 1951, 1953, pp. 416-20, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1420.

With pears and with most varieties of apple, very satisfactory results were obtained with 5% of carbon dioxide and 16% of oxygen, the atmosphere generally recommended. Peaches, plums and oranges were not suited to gas storage. In studies on skin coatings on apples, a close inverse relation was found between the oxygen concentration of the internal atmosphere of the fruit and the rate of yellowing of the skin. Most of the experiments were carried out with the varieties Jonathan, Granny Smith, Delicious, Democrat, Rome Beauty, and London Pippin; recommended gas storage conditions for these varieties are tabulated. With pears, gas storage in 5% of carbon dioxide and 16% of oxygen, at 0° C., increased the storage life of the 6 main Australian varieties, when they had been picked at the correct stage; but effects varied between varieties and to some extent between seasons. The average storage lives of these varieties in air and in gas are tabulated. The greatest increase in storage life due to gas storage was obtained with Williams' pears. Initial storage in air rendered pears far more liable to injury in subsequent gas storage. The concentration of carbon dioxide in the storage atmosphere must be brought to the desired level of 5% within a week.

3879. U.S. REFRIGERATION RESEARCH FOUNDATION.
Storage requirements of Bartlett pears.
Ice and Refrig., 1951, 121 (3): 26, *Mod. Refrig.*, 1951, 54: 22, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1395.

Bartlett pears should not be picked until the ground colour begins to lighten and the lenticels have corked over. Immediate and rapid cooling is important for successful storage. The pears can be pre-cooled loose in lug boxes in forced air; if they are packed, space must be allowed between the packages for adequate air circulation. Pears should be stored at 29° to 31° F., with a relative humidity above 85%, and preferably about 90%. For long storage, low temperatures are required. The pears are best ripened at 60° to 70° F., preferably at 65° F.

3880. CARNE, W. M., AND WALSH, J. C.
The sea transport of pears and apples from Australia and New Zealand.
Proc. 8th int. Congr. Refrig., Lond., 1951, 1953, pp. 639-43, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1396.

Australian and New Zealand pears should be loaded in a hard, pre-cooled condition, and rapidly cooled to the lowest mean temperature free from the danger of freezing. The time-in-ship factor should be limited to 50 to 60 days for Williams' pears and 70 to 80 days for the other main varieties. Since apples from different States in Australia vary in their liability to develop low temperature injury, and since this liability varies with different seasons and mean fruit sizes, it is most undesirable to mix in a consignment apples grown in different States. The best carriage is obtained by using the lowest safe temperature. Suitable temperatures and percentages of carbon dioxide in the atmosphere are suggested for apples from New Zealand, and from each of the Australian States.

3881. GAC, A.
Influence de l'humidité relative sur le comportement des pommes et des poires au froid. (Influence of relative humidity on the behaviour of apples and pears in cold store.)
Proc. 8th int. Congr. Refrig., Lond., 1951, 1953, pp. 568-70, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1385.

The behaviour of Passe-Crassane pears, held at 0° and 5° C., and Calville apples held at 10° C., was studied in stores with relative humidities of 65, 80, and 98%. The higher the humidity, the greater was the percentage of apples with physiological injury; apples with water core were frequently found at high humidity and temperature. The content of sugars and acid and the composition of the internal atmosphere in the fruit were little affected by external relative humidity.

3882. FIDLER, J. C.
The concentration of volatile organic compounds in gas stores containing apples and pears, and methods for removing them.
Proc. 8th int. Congr. Refrig., Lond., 1951, 1953, pp. 429-32, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1419.

During the 1950-51 season, the first measurements were made of the concentration of volatile substances in gas stores containing pears; the pears were stored in an atmosphere containing 7.5 to 8% of carbon dioxide and 13% of oxygen, instead of in the optimal gas mixture, which would have involved the use of scrub-

bers. The 2 varieties of pear used, Conference and Doyenné du Comice, were found to differ markedly in rate of production of volatile substances. After about 70 days, during which the concentration of ethylene in the stores increased steadily, a level of 5 to 6 mg. of carbon per 100 l. of gas was attained in the store holding Conference; with Doyenné du Comice, this level was 3 times as high. Pears appear to produce less "odorous" volatile substances than apples. The 3 main methods of removing the volatiles are: (1) adsorption on an active surface; (2) absorption in a solvent; and (3) combination with a chemical reagent. Results so far obtained by various methods are summarized. A search continues for a reagent which will remove ethylene without injuring the fruit. [For the author's work on apples see *H.A.*, 1950, 20: 1138.]

3883. DATE, W. B., AND HANSEN, E.
Synthesis of pectic substances in the post-harvest condition of pears.
Curr. Sci., 1953, 22: 145-6.

During cold storage investigations at Oregon State College the amounts of both protopectin and total pectin increased during storage in all pear varieties tested (Bartlett, Bosc and Anjou). This suggests that pectic substances are synthesized during the post-climacteric period.

3884. HALLER, M. H.
Handling, transportation, storage, and marketing of peaches.
Bibl. Bull. U.S. Dep. Agric. 21, 1952, pp. 105, bibl. 233.

This is a review and digest of recent work [predominantly American] and covers (1) the physical and biological aspects of the development of the peach fruit as it approaches maturity, and (2) its handling in the fresh state from harvest to the consumer. The first and shorter part describes the changes taking place in the fruit before picking with regard to size, shape, colour, firmness and texture and composition. In the second part methods of determining maturity, harvesting, grading and packing, factors affecting quality, respiratory activity, storage, pre-cooling and transportation are discussed. The actual process of marketing is dealt with only briefly, but market diseases, in particular brown rot, are discussed at some length and measures for their control are suggested.

3885. TRUSCOTT, J. H. L., AND CROWTHER, R. F.
Retention of high quality in stored peach.
From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

Several varieties of peach grown at the Experiment Station, Vineland, Ont., were stored at temperatures ranging from 30° F. to 55° F., for a period of one to four weeks in 1951 and 1952. A less mature and a more mature sample of fruit were compared after each storage treatment. It was found generally that the more mature fruit retained eating quality to a greater degree than did the less mature, and that high eating quality is quite stable in storage during two weeks at temperatures ranging from 30° F. to near 40° F. Adequate refrigeration facilities appear to be a necessity, if a consistently high quality fruit is to reach the consumer. Storage beyond two weeks is hazardous.

3886. BOARD, P.

Cool storage of Clingstone peaches.

Food Pres. Quart., 1953, 13: 10-12, bibl. 3.

One year's trials showed that Golden Queen peaches will give canned products of satisfactory quality if stored at 30° F. for a period of up to 4 weeks. The storage life can be extended by a ripening period of 4-5 days at 68° F., either before or after cold storage. In certain seasons, however, losses from brown rot or transit rot will be severe if ripening of the fruit is attempted.—C.S.I.R.O. Food Pres. Lab., Homebush.

Processing and fruit products.

(See also 3771f, 3891f, 1, o, 4376, 4730, 4739.)

3887. BARKER, B. T. P.
Cider and cider-making fifty years ago.
Science and Fruit, 1953, pp. 29-44, bibl. 3, illus.

Fifty years ago it was possible to sell as cider a synthetic, carbonated, sweetened and artificially flavoured concoction entirely devoid of apple juice. One of the earlier successes of the newly established Cider Institute was to devise a test whereby the Government Chemist could determine the absence of apple juice. Convictions based on its absence resulted in it becoming illegal to designate as cider any drink not derived from apple juice. In 1903 cider making as generally practised on the farm consisted merely in the expression of juice from the fruit and subsequent storage of the liquor in casks left unbunged until the ensuing spontaneous fermentation had come to an end. Another very much less rough type was that evolved by the Butleigh experiments. Farm and factory procedure of those days are described in some detail and notes are given on the use of by-products.

3888. CHARLEY, V. L. S., AND POLLARD, A.
Developments in fruit products.
Science and Fruit, 1953, pp. 78-98, bibl. 46.

An illuminating study is presented of the primary development work until 1939, the specialized contribution of the Cider Section of Long Ashton to food problems during the war period, 1939-1945, and the more detailed and fundamental work since then to elucidate certain problems of the industries concerned in the manufacture of fruit juices.

3889. JOUBERT, J.
The drying of apricots.
Dec. Fruit Gr., 1952, 2 (12): 10-11.

The author describes the method whereby whole apricots are dried. The advantages are more attractive appearance, better retention of flavour, and better texture than in the normal half-apricot drying method. The disadvantage is the greater cost involved which would necessitate an addition of 2d. a lb. to wholesale price.

3890. SERVICE DE L'HORTICULTURE, MAROC.
Note sur le séchage des figues en milieu marocain. (Fig drying in Morocco.)
Terre maroc., 1953, 27: 198-201.

White, well caprifigged, thoroughly ripe figs, preferably

of the varieties Beida, Hafer el Brel, Ournaksi or Ferzaoui, should be used. Before drying, substandard fruit should be removed and the remainder graded for size and dipped in boiling brine to prevent browning. The figs should then be sun-dried on simple trays for 4-6 days, pressed for 12 hours to cause exudation of sugar which on crystallization gives the fruit an attractive whitish appearance, shade-dried for a further 4-8 days and finally placed for a while in a large airtight container to ensure uniformity of humidity.

Noted.

3891.

- a ALMEIDA, C. R. MARQUES DE.
Afinidade. (Compatibility.) [English and French summaries 1 p. each.]
Bol. Junta nac. Frut. Lisbon, 1951, 11: 22-44, bibl. 20 [received 1953].
The probable causes of stock/scion incompatibility are discussed.
- b AMERICAN FRUIT GROWER.
What's new in irrigation equipment?
Amer. Fruit Gr., 1953, 73 (6): 16-17, illus.
Many new models illustrated.
- c ANDERSSON, I.
Frukträdssortimentet i plantskolor år 1951. (Top fruit varieties in Swedish nurseries.)
Sver. pomol. Fören. Årsskr., 1952, 1953, 53: 64-75.
- d ANJANEYULU NAIDU, N.
Immature fruit drop—causes and cures—a review.
S. Indian Hort., 1953, 1: 3-12, bibl. 39.
- e BALSÅRD (GRANHALL, I.).
Föreningen för Växtförädling av Frukträd, Verksamhetsåret 1952. (Annual Report of the Society for Fruit Tree Breeding, Balsgård, for 1952), 1953, pp. 18.
Work on the same lines as before [*H.A.*, 23: 1393].
- f BEECH, F. W., AND CARR, J. G.
Disorders of cider.
Science and Fruit, 1953, pp. 68-77, bibl. 22.
- g FERRIS, L. W.
Report on fruit (tartaric and laevo-malic) acids.
J. Ass. Off. agric. Chem. Wash., 1953, 36: 266-70, bibl. 5.
Method of determination.
- h FISHER, E. G.
Top-working and bridge-grafting fruit trees.
Ext. Bull. Cornell agric. Exp. Stat. 882, [1953?], pp. 15, illus.

- i GERRITSEN, C. J.
Perspectieven door rassenonderzoek en het kweken van nieuwe rassen. (Prospects of variety trials and raising new varieties [of cherry].)
Meded. Inst. Vered. Tuinbouwgew. 50, 1953, pp. 32-46, illus.
- j GERRITSEN, J. D.
De economische positie van de kersenteelt in het Rijkstuinbouwconsulentschap Geldermalsen. (The economic position of cherry growing in Geldermalsen.) [English summary 1½ p.]
VAN DE GEYN, S. A. H. M.
De economische positie van de kersenteelt in Zuid-Limburg. (The economic position of cherry growing in South Limburg.) [English summary ½ p.]
SLITS, H. J. A.
De economische positie van de kersenteelt in Uden en in het land van Maas en Waal. (The economic position of cherry growing in Uden and in the Maas and Waal district.) [English summary 1½ p.]
Meded. Inst. Vered. Tuinbouwgew. 50, 1953, pp. 6-11, 12-14, 15-19 resp.
- k GUILLAUMIN, A.
Hybrides ou chimères? (Hybrids or chimeras?)
C.R. Acad. Agric. Fr., 1953, 39: 466-7.
Notes on *Crataegomespilus* and *Pyrocydonia*.
- l LUZ, F. DE S.
A indústria espanhola de polpa de alperches. (The apricot pulp industry of Spain.) [English and French summaries ¾ p. each.]
Bol. Junta nac. Frut. Lisbon, 1951, 11: 45-86, illus. [received 1953].
- m MEURMAN, O.
Nyare principer för beskärning av fruktträd. (Recent methods of pruning fruit trees.)
Sver. pomol. Fören. Årsskr. 1952, 1953, 53: 13-21.
European and American.
- n NORBURY, C. P.
Modern developments in fruit growing.
J. roy. Soc. Arts, 1952, 100: 719-34.
In England.
- o POLLARD, A.
Factors affecting the quality of cider.
Science and Fruit, 1953, pp. 56-67, bibl. 29.
- p REMY, A.
Quelques remarques sur la culture du pommier en buisson. (Some notes on bush apple cultivation.)
Pomol. franç., 1953, 80: 59-63, illus.
On Doucin at the École d'Arboriculture fruitière d'Écully since 1943.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 3749, 3773, 3774, 3788, 3789, 3819, 3840, 3945, 3951b, c, i, j, 4733, 4740.)

3892. BOULD, C., AND OTHERS.

Some aspects of blackcurrant culture.

Science and Fruit, 1953, pp. 120-30, bibl. 17, illus.

A report on work done at Long Ashton since 1914 shows progress in control of big bud and reversion, in the production of new varieties, methods of cultivation, manuring and pest and disease control. Particular attention is now being paid to automatic spray application.

3893. NEW JERSEY BLUEBERRY RESEARCH LABORATORY.

10th-21st Annual Blueberry Open House, December 1941-December 1952 [mimeo].

These yearly reports afford useful practical notes on most problems of blueberry cultivation. The 21st Annual Blueberry Open House (pp. 17) held at Pemberton, N.J., in December 1952, includes papers on the following subjects: pruning; inspection and certification for stunt disease; 3 new blueberry varieties for New Jersey (Herbert, Earliblue and Ivanhoe); disease and pest control; and control of mummy berry disease.

3894. ANON.

Blueberry Tax Progress Report. Research and Extension Work.

Misc. Publ. Me agric. Exp. Stat. 622, 1953, pp. 15, illus.

A popular account of research at the Blueberry Hill Research Farm at Jonesboro. Projects included insect control, disease control (ziram, fermate and ferbam are under trial), rhizome cutting with a tractor-mounted disc harrow to produce better stands and higher yields, processing and handling, irrigation, pruning (a comparison of ordinary burning, mowing, herbicidal oils treatment, mowing plus herbicidal oils treatment, and mowing plus herbicidal oils treatment plus pentachlorophenol), selection and breeding, manuring, and weed control (2,4-D, 2,4,5-T and ammate).

3895. DOEHLERT, C. A.

Facts about fertilizing blueberries.

Circ. N.J. agric. Exp. Stat. 550, 1953, pp. 6.

This publication is a revision of *Circular* 483 [see *H.A.*, 14: 1548]. Recommendations are made for the fertilization of propagating beds, nurseries, newly planted fields and bearing bushes.

3896. MEYER, F.

Teelt der blauwe bessen (*Vaccinium corymbosum*). (Blueberry culture.)

Cult. Hand., 1953, 19: 424-7, bibl. 1, illus.

Blueberries have so far been grown in Belgium only on an experimental scale. The varieties Cabot, Rancocas, Jersey, Concord and Stanley have given good results. Methods of culture and propagation are described.

3897. (GOHEEN, A. C.)

Dry scooping damages cranberry vines.

N.J. Agric., 1953, 35 (2): 5, 11, illus.

Figures are presented showing that cranberries unharvested for 1 year produced 4 times as much fruit

the following year as those harvested by dry-scooping the previous year. In a storage test it was found that berries from the vines left undisturbed the previous season kept much better than the others.

3898. ANON.

New small gooseberry grader now in production.

Comm. Grower, 1953, No. 2998, p. 1249, illus.

The design of a new, compact gooseberry grader, capable of an output of 8-10 cwt. per hr, is described and illustrated. It is driven by a $\frac{1}{2}$ h.p. electric motor; there are 4 grades; and modified versions can be made for plum, onion and bulb grading.

3899. KRONENBERG, H. G.

Ervaringen met aardbeirassen in 1953.**(Strawberry variety trials in 1953.)**

Fruiteelt, 1953, 43: 618-20, illus.

The results are reported of trials carried out by the Strawberry Study Commission of the Central Bureau for Horticultural Marketing, Holland, with new strawberry varieties and selections. These include Macherauch's Frühernte, Regina, Boettner 102, Bowa, Die vom Kirschenhof, Ydun, Auchincruive Climax, Georg Soltwedel and several Senga selections. None proved better than the best standard varieties grown in Holland, although some are considered worth further trial, and Macherauch's Frühernte was very good for the fresh fruit market.

3900. LARSSON, G.

Jordgubbsförsök i Norrbotten 1947-52.**(Strawberry trials in Norrbotten 1947-52.)**

Sver. pomol. Fören. Årsskr. 1952, 1953, 53: 45-51, illus.

A report of strawberry variety trials carried out at Sweden's northern Research Station, Öjebyn, and at Pålken, at a latitude of 65-66°.

3901. MEDVEDEVA, O. A.

Strawberry varieties for the Leningrad region.

[Russian.]

Sad i Ogorod, 1953, No. 7, pp. 11-13, illus.

Records produced since 1947 show that during favourable winters strawberries overwintered well, but in seasons when the temperatures fluctuated sharply and snow cover was absent some varieties suffered up to 62% loss. Frost resistance, productivity, earliness, flavour, quality (sugar content) and fruit size of some varieties are noted. In the Leningrad area fruit rot and mites are the most important enemies of the crop.

3902. LABUS, O.

Altes und Neues über den Anbau der Erdbeere. (Strawberry growing in the Alte Land.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 119-21, 135-7, 170-3.

Irrigation, time of planting, varieties, yield records, packing and storage.

3903. KRONENBERG, H. G.

Selection and certification of clonal stocks of strawberry varieties.

Euphytica, 1953, 2: 147-8.

A brief account is given of the system used in Holland.

for the certification of clonal stocks of strawberry varieties, approved for cropping capacity and apparent health. The certificate at present given by the N.A.K.B. is no guarantee of freedom from virus and in future a new certificate will be needed for clones that are completely virus-free and have given satisfactory results in field trials.

3904. BERGELIN, E.

Försök med Miniaturväxthus till jordgubbar vid Alnarp 1949-51. (Strawberry trials under cloches at Alnarp, 1949-51.) *Sver. pomol. Fören. Årsskr.* 1952, 1953, 53: 100-7, bibl. 2, illus.

In a three years trial with 4 strawberry varieties cloches were found to advance maturity by 5-20 days, according to season and variety, as compared with plants grown in the open. In respect of earliness and yield cloches proved better than frames. These results suggest that strawberry growers in Sweden may find them a good investment.

3905. DELVER, P.

Phaenologische waarnemingen bij aardbeien. (Phenological observations on strawberries.) [English summary $\frac{1}{2}$ p.] *Meded. Dir. Tuinb.*, 1953, 16: 391-405.

Phenological data are recorded for the strawberry Deutsch Evern during 1950 and 1951 at numerous places in Holland. Differences in development were only noticeable between the most southerly and most northerly provinces, and these differences became less pronounced as the season advanced. Differences between the dates of first picking were only 9 days in 1950 and 6 days in 1951, whereas in other parts of Holland harvesting began within a period of 5 days.

3906. MOSSE, B.

Fructifications associated with mycorrhizal strawberry roots. *Nature*, 1953, 171: 974, bibl. 4, illus.

This is the first description of the reproductive stage of vesicular-arbuscular mycorrhizal fungi. In 1951, fructifications of the Endogone type were found attached to mycorrhizal strawberry roots grown in pots. The presence of hyphal connexions between these fructifications and the mycorrhizal fungus inside the strawberry roots is illustrated by photographs. Successful mycorrhizal infections have been obtained in strawberry seedlings, using the fruit bodies and sterilized, excised spores from these to provide the fungus constituent.—East Malling.

Vines.

(See also 3778, 3824, 3839, 3862, 3951a, e, f, g.)

3907. I.R.S.I.A.

Comptes rendus de recherches. No. 10. Travaux du comité pour les recherches scientifiques en viticulture. (Research reports. No. 10. Work of the committee responsible for scientific research on viticulture.) [Flemish and French.] L'Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture, Brussels, 1953, pp. 169, bibl. 109, illus., 200 fr.

The committee was set up in 1947. *Soil and manurial problems in greenhouse viticulture.* (Stenuit, D., and

van der Auwera, G.) Among Belgian soils the brick earths are by far the best for viticulture. Topics discussed include pH values, chemical fertilizers, Fe and N deficiencies, organic manures and excess of Cl and B. *Studies on the breeding, culture and parasites of the vine.* (de Marneffe, R., and Delhay, R.) Breeding is mainly directed towards improving the varieties Gros Colman, Muscat d'Alexandrie, Léopold III and Cannon Hall. Pollen germination studies on these and other varieties are described. The effect of growth promoting substances on the inflorescences of the 4 named varieties was studied; ortho-chloro-phenoxy-propionic acid and especially 2,3,5-triodobenzoic acid gave favourable results. In rootstock studies the suitability of various local varieties used for this purpose was investigated. In rooting tests the effect of a protective soil covering and of aeration were studied. Hydroponic studies with cuttings were designed to discover a method permitting the cultivation of single plants at low cost for experimental purposes. Biological and control studies on *Eotetranychus telarius* were conducted; the first treatment should occur 10-15 days after harvesting and consist of a thorough spraying with a product possessing prolonged residual effect or a mixture of 2 products, one of which has a residual effect and the other is an ovicide. A series of treatments spread over 10 days should be given after the growth flush; the first should be a spray and the rest aerosol or fumigation treatments; they should be made with products having prolonged residual effects to destroy overwintering females as they emerge from hibernation.

3908. MARIMAN, G.

Viticulture septentrionale en plein air. (Open air viticulture in northern districts.) *Courr. hort.*, 1953, 15: 157-9, 208-12, 274-9, bibl. numerous in text, illus.

In support of the claim that open air viticulture could profitably be revived in Belgium, the author quotes the results obtained in several Belgian vineyards, giving details of the varieties grown. He then describes the technique of wine-making on a domestic scale and reviews literature on viticultural practice and on the history of vine growing in Belgium. For open air production he recommends early and very early, disease-resistant varieties, such as the hybrid direct producers.

3909. CONSTANTINIDES, C.

Viticulture in Egypt.

Plant Prot. Overs. Rev., 1953, 3 (4): 5-12.

The principal varieties of wine, table and raisin grapes grown in Egypt are listed. The commonest method of propagation is by cuttings; grafting is rare owing to the absence of phylloxera; layering is used for gapping up. One-year-old rooted cuttings are planted out at 2×2 m. if to be grown as bushes, or at 3×1.4 m. if to be trained on wire. Notes are given on the head, cordon and arbor forms of pruning and on the short (2-3 buds per cane), long (3-4), and mixed systems; on soil management, manuring and irrigation; and on the chief pests and diseases and their control.

3910. GIRARD, P. J.

The Guernsey grape industry.

Reprinted from *Trans. Soc. guern.*, 1951, pp. 126-44, bibl. 50.

An account is given of the Guernsey greenhouse

dessert grape industry which appears to date from about the beginning of the nineteenth century, and of its decline. Exports fell from about 2,000 tons a year in 1912 to 650 in 1939; in the post-war period they fell from about 750 tons in 1946 to about 500 in 1950. Notes are given on some of the varieties grown, of which Black Hamburg, Alicante, Gros Colman and Muscat of Alexandria are important, and on cultural methods.

3911. CHAIRMAN OF THE PHYLLOXERA BOARD.
Grapevine varieties in South Australia.

J. Dep. Agric. S. Aust., 1953, 56: 516-17.

A table and map give details of acreage under different varieties. The leading varieties are: Sultana 10,198 acres, Currant (Zante), Muscat Gordo Blanco, Grenache, Shiraz (Syrah), Doradillo (5,304 acres) followed by 30 others on smaller areas.

3912. ARTOZOUL, J.

Notes ampelographiques sur la série 12,000 Seyve-Villard. (Ampelographic notes on the series 12,000 Seyve-Villard.)

Progr. agric. vitic., 1953, 139: 355-8; 140: 15-20, 39-41.

Notes are given on the characters of the fruit clusters, buds and young leaves, branches, shoots and leaves of the 18 commercial varieties of the series 12,000 Seyve-Villard. They all arise from the same 6468 S × 6905 S cross.

3913. LEBEDEVA, L. JA.

Experiments in the cultivation of the Amur vine. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 6, pp. 30-6, illus.

The Amur vine [*Vitis amurensis*] grown under normal cultivation at the Far Eastern Experiment Station VIR was found to be more vigorous, productive and frost-resistant than in the wild state. Phenological data on its development are tabulated. The quality of the grapes produced by the cultivated vines is said to be good. Of the 29 varieties of vine grown at the station 10 produce grapes with sugar contents higher than 11%, and of these 7 were obtained from crosses with the Amur vine. Selections suitable for cultivation are recommended, No. 230 being the most promising.

3914. MILISAVLJEVIĆ, D.

A 15-year investigation of musts in Vojvodina. [Serbian, with French summary ½ p.] *Arh. poljopr. Nauk.*, Belgrade, 1951, 4 (6): 57-75, bibl. 9 [received 1953].

After describing the vine-growing areas and the varieties therein, the results of must analyses, from 32 grape varieties, made in 1932-1940 and 1942-1948 are given. The average sugar content was 19.23% (giving 11.3° alcohol) and tartaric acid content 5.97 g/l.

3915. SOSUNOV, V. I.

Cross-pollination in vines. [Russian.]

Sad i Ogorod, 1953, No. 5, pp. 26-7.

Data are presented showing that even the self-fertile vine varieties such as Šasla Muskatnaja and Malengr Rannii [Early Malengr] benefit from cross-pollination. The quantity of ripe berries on these varieties cross-pollinated by a number of other varieties was increased

on an average by 15.8% compared with those self-pollinated. In trials with other varieties the sugar content of the grapes was increased by cross-pollination.

3916. ANON.

Sélection et conditions de livraison de vignes porte-greffes. Grèce. (Selection and conditions of issue of vine rootstocks. Greece.)

Bull. Off. int. Vin, 1953, No. 267, pp. 10-11.

The use of rootstocks is comparatively recent in Greece and material is derived from multiplication of the original controlled introductions. The chief rootstocks used have shown good affinity for Greek *vinifera* varieties with the exception of *Riparia* × *Rupestris* 3309 C for the wine variety Mavro Naoussis.

3917. COSOLO, G.

Sélection et conditions de livraison de vignes porte-greffes. Italie. (Selection and conditions of issue of vine rootstocks. Italy.)

Bull. Off. int. Vin, 1953, No. 267, pp. 12-17.

Notes are given on measures taken to combat the threat of phylloxera since the insect made its appearance in Italy in 1870-80. It can be said that the rootstocks now available have solved the problem of the reconstitution of the vineyards. Among the best are the *Riparia*-*Berlandieri* hybrids, especially Kober 5BB, Teleki 8 (clonal selection of Ferrari) and 420A. In the south 420A and the hybrids of Paulsen, Ruggeri and Prosperi predominate, but *Riparia*-*Rupestris* 3309, *Riparia*-*Rupestris* 101-14 and *Rupestris* du Lot are also used.

3918. KIEFFER, —.

Sélection et conditions de livraison de vignes porte-greffes. Luxembourg. (Selection and conditions of issue of vine rootstocks. Luxembourg.)

Bull. Off. int. Vin, 1953, No. 267, pp. 17-19.

The reconstitution of the Luxembourg vineyards was virtually completed some years ago. The rootstocks used are 5C and 5BB. Mother-plantations produce all the stocks required in Luxembourg, negative mass selection being carried out.

3919. STAEHELIN, M., AND LEYVRAZ, H.

Sélection et conditions de livraison de vignes porte-greffes. Suisse. (Selection and conditions of issue of vine rootstocks. Switzerland.)

Bull. Off. int. Vin, 1953, No. 268, pp. 18-21.

Mass and individual selection are practised. Plantations for individual selection consist of 3309, 5BB and 5C. In French Switzerland and Tessin *Rip.* × *Rup.* 3309 gives good results on permeable, moderately calcareous soils without too much moisture; 5BB, 5C and 161-49 are satisfactory on moderately suitable soils and 41B, 143B, 3306, 420A and 1202 are among those used on soils which present serious problems. Chasselas, Riesling-Sylvaner, Sylvaner, Pinot (blanc, gris and noir) and Gamay de Beaujolais show affinity with the chief rootstocks used.

3920. ANON.

Sélection et conditions de livraison de vignes porte-greffes. Tunisie. (Selection and conditions of issue of vine rootstocks. Tunisia.)

Bull. Off. int. Vin, 1953, No. 268, pp. 21-5.

The chief rootstocks used are the French R99, 161-49,

41B and 150-15 and the Italian 140R, 1045, 1103, 1447 and 775. Mother plantations of these have been established. Berlandieri hybrids alone have proved well adapted to the calcareous soils and irregular rainfall of Tunisia.

3921. MILOVIĆ, V.

Prilog poznavanju loznih podloga u krajinskom vinogradarskom rejonu. (A contribution to the study of vine rootstocks in the vineyard area of Krajina.) [French summary 1 p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 144-50.

Aimed at ascertaining the cause of high mortality in grafted vines, an experiment was started in 1938, using 3 important rootstocks. After 8-9 years the mortality was found to be 19% on *Rupestris du Lot*, 23% on *Berlandieri* × *Riparia*-Teleki 8B and 74% on *Riparia* × *Rupestris* 3309. Where the scion varieties were those officially recommended for the district, the figures were 13, 34 and 60% respectively. Observations on yields and mortality led to the conclusion that the trouble was due to insufficient compatibility.

3922. NAIDENOV, L. N.

A valuable rootstock variety. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 7, pp. 48-9, bibl. 2, illus.

Berlandieri × *Riparia* 5BB is notable for its phylloxera resistance and good rooting capacity, and is particularly suitable for Moldavian conditions. In comparative trials in 1951 and 1952 varieties on this rootstock grew more vigorously and produced higher yields than on *Riparia* × *Rupestris* 101-14.

3923. TOSKIĆ, V., AND AVRAMOV, L.

Primena sintetičkih fitohormona za vegetativno razmnožavanje podloga vinove loze. (The use of synthetic plant hormones in the vegetative propagation of vine rootstocks.) [German summary 1½ pp.]

Zemlj. i Bilj., Belgrade, 1952, 1: 39-50, bibl. 14, illus.

In trials at Zemunu in 1947-1950 with 4 synthetic hormones, the proprietary preparations Rooton (American) and Roche 202 (Swiss) had the best effects on the rooting of cuttings, and the rootstock Chasselas × *Berlandieri* 41B, which is difficult to root, responded the most favourably to the treatments. Work is to continue with a view to finding better materials and improving methods of application.

3924. BOULAY, H.

Une nouvelle méthode d'enracinement des plants greffés soudés de vigne. (A new method of rooting grafted grape stocks.)

Bull. tech. Inf. Serv. agric., 1952, 70: 371-5, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17651.

Grafted stocks are put into compost, inserted in perforated cardboard tubes, and packed upright in a box heated from the bottom to allow gradual root formation. Grafts are progressively acclimatized to external conditions. In early June they are planted in the vineyard or nursery. The method is claimed to increase considerably the percentage of take, to reduce

propagation time by a year and to save space in the nursery.

3925. TOSKIĆ, V., AND AVRAMOV, L.

Uticaj dužine reznice na ožiljavanje i na razviće prporaka loznih podloga. (The influence of the length of cutting on root development in vine rootstocks.) [English summary 1 p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 26-36, bibl. 12, illus.

The considerable variation found in the percentage of rooting in vine cuttings was primarily due to the different lengths of the cuttings and to a lesser degree to climatic, soil and other conditions. The morphology of the root system was also strongly influenced by the length of the cutting. Under the conditions of the experiment the most satisfactory results were obtained with cuttings of the following lengths: 20-35 cm. for the varieties *Riparia portalis* and *Rupestris du Lot*, and 30-45 cm. for *Berlandieri* × *Riparia* Teleki 8B, *Berlandieri* × *Riparia* Kober 5BB and Chasselas × *Berlandieri* 41B. Short cuttings were more seriously affected by very dry weather than long cuttings.

3926. BISSON, J.

Influence de la dessiccation des sarments sur leur reprise au bouturage. (The effect of desiccation of [vine] shoots on their take as cuttings.)

Progr. agric. vitic., 1953, 139: 329-32.

The critical level of loss of moisture in vine shoots stored for use as cuttings and the effect of soaking them before planting were studied at the Centre de Recherches agronomiques du Sud-Ouest in 1951 and 1952. The moisture contents of shoots taken directly from the plant were 60% in the variety Merlot, 45% in Sauvignon and 51% in 4453 Malègue. At the beginning of April 3 lots of 50 Merlot shoots, 50 cm. long, were subjected to the following different treatments: (1) hot room for 4 days at 30° C., and thereafter held at 15° C. with no air or light; (2) cold room at 10° C. exposed to north light, airy; (3) unheated greenhouse, temperature rising to 25-30° C. during the day and falling at night, humidity kept high by frequent waterings. At the end of May the moisture losses were 26, 30 and 23% respectively. Lots of 50 Merlot shoots, 50 cm. long, with 0, 2, 7, 9, 13 and 15% moisture loss gave 60, 64, 46, 8, 2 and 4% take respectively. Similar lots of 4453 Malègue with 0, 2, 4, 7, 9, 14 and 16% moisture loss gave 62, 42, 20, 13, 2, 13 and 8% take when planted without previous soaking, and 95, 60, 64, 62, 43, 34 and 24% take respectively when soaked for 24 hours before planting. From these experiments it was concluded that (1) wood which has lost more than 7% of its moisture content shows a loss of vitality; (2) soaking before planting is of value even for carefully stored wood, provided it has not lost more than 10-12% of its moisture content.

3927. MANZONI, L.

Germogliamento della vite e fattori che lo influenzano. (Shoot growth in vines and factors affecting it.)

Riv. Vitic. Enol., 1953, 6: 99-102, bibl. 7.

A review article. A fair, warm spring favours rapid, even sprouting in both early and late varieties; an unfavour-

able spring causes late irregular sprouting of late varieties. Sprouting is delayed by unfavourable aspect, late dormant pruning, light dormant pruning, excessive vigour, disease and defoliation in the previous year, and certain dormant sprays. Apical buds open first; even median buds in lightly pruned branches may remain dormant; basal buds ordinarily do not sprout unless pruning has been very severe.

3928. MANZONI, L.

Il grappolo e la fioritura. (The vine inflorescence and flowering.)

Riv. Vitic. Enol., 1953, 6: 163-73, bibl. 11, illus.

A review article on the development of the vine inflorescence and factors affecting it.

3929. MALAN, A. H.

Limitation of the table grape crop.

Fmg S. Afr., 1953, 28: 201-2, 205, illus.

An account is given of studies conducted since 1943 on the correct time of bunch thinning for limiting the table grape crop. Varieties inclined to non-setting (e.g. Hanepoot, Alphonse Lavallée) may be thinned before or after blossoming. Bunch thinning must occur after fruit setting in varieties with a tendency to set undesirable seedless berries (e.g. Waltham Cross and Queen of the Vineyard), when the difference between seeded and seedless berries is plainly discernible; and also in varieties in which the grapes are normally too densely packed in the bunch (e.g. Barlinka, Prune de Cazouls). —W. Prov. Fruit Res. Stat., Stellenbosch.

3930. ŠČEBLYKINA, V. M.

The effectiveness of split applications of fertilizers on vineyards. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 7, pp. 44-6.

In Azerbaïdžan NPK applied at the rate of 135: 135: 90 kg. per ha. in 2 doses (before and during bud burst) and 3 doses (before and during bud burst and before ripening) resulted in a higher nitrate and phosphoric acid content of the soil, particularly during the latter part of the season, than when the fertilizer was applied in a single treatment early in the spring. The 2 split applications produced yield increases of 20.2% and 26.7% respectively.

3931. WEGER, B.

Effetti dell'irrigazione a pioggia sulla vite e sul vino nella zona collinosa della conca di Bolzano. (The effect of sprinkler irrigation on vines and wine in the hilly region of the Bolzano hollow.)

Riv. Vitic. Enol., 1953, 6: 176-8.

Sprinkler irrigation of vines was first practised in Italy in 1930 in the S. Maddalena-Bolzano region. Experience shows that 1-10 applications per season are required according to soil and slope, that applications should not be too frequent, that adequate moisture is particularly desirable when the grapes are turning colour as sugar formation is then occurring, that the soil should be moistened to a depth of 40 cm., and that the total amount of water required to irrigate a crop may reach 400 cu. m. per ha. Contrary to opinion commonly held sprinkler irrigation was not found to favour downy mildew. As regards oidium, two extra sprays are necessary. It has practically eliminated trouble from

mites. It is suspended from 10 to 25 May during the egg-laying period of the grape moth. It has raised the sugar content of the wine by 2%, improved its flavour and increased production by a third. It permits the use of Riparia as a rootstock on gravelly slopes instead of Kober 5BB or a Rupestris, shortens by 2-3 years the period taken to reach full development, facilitates cultivation of the soil, and permits undercropping with legumes as soil improvers.

3932. NORDMANN, —.

Erfahrungen mit der Vogelmiere. (*Stellaria media* as a green manure plant in vineyards.)

Weinbau, 1952, 7: 79, from abstr. in *Z. PflKrankh.*, 1953, 60: 316.

The value of chickweed, *Stellaria media*, as a green manure in vineyards has been recognized for some time. The author reports on trials in the Nahe district where the weed was sown deliberately.

3933. RESEARCH INSTITUTE FOR VITICULTURE AND WINEMAKING, BRATISLAVA.

Pokusy s rezom vinnej révy. (Predbenžné sdenie.) (Pruning trials with vines. (Preliminary communication.)) [Russian summary $\frac{1}{2}$ p.]

Sborn. čl. Akad. zeměd. Věd,* 1953, 26: 17-24, bibl. 6.

In 1951 trials were established to find the most suitable method of pruning vines grown in the region of the Small Carpathian mountains. Results obtained with 7 varieties at the end of the first season are discussed.

3934. MCKENZIE, W. M.

An investigation of the suitability of sawdust for packing grapes.

Progr. Rep., C.S.I.R.O. For. Prod. Div. Sub. Proj. U 16-1, 2, 1953, pp. 19, from *Abstr. publ. Paps C.S.I.R.O.*, Vol. 1, No. 6.

Comparison of cork-packed and sawdust-packed Ohanez grapes at Homebush showed that degrade, faint and separation of packing material were no worse with sawdust than with cork. Degrade was reduced by adding $\frac{3}{4}$ oz. metabisulphite per cu. ft. packing material. A sample sawdust pack was unfavourably received in Singapore.

3935. OURNAC, A.

Recherches sur la maturation artificielle du raisin. (Experiments on the artificial ripening of grapes.)

Ann. Inst. nat. Rech. agron., Sér. E, Ann. Tech. agr., 1952, 1: 85-105, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1484.

No satisfactory results were obtained in the ripening of grapes under the influence of either hot air or infra-red radiation treatments.

3936. APP, J., AND OTHERS.

More storage time for grapes. I.

Ice and Refrig., 1951, 120 (5): 43-5, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1447.

The use of germicidal treatments to inhibit mould growth and prolong the cold storage life of Emperor

* Formerly *Sborn. čl. Akad. Zeměd* [then Agriculture, now Agricultural Science].

and Almeria grapes was investigated. Dips were used to decrease field contamination carried into storage, and overwrapping to eliminate storage contamination; overwrapping + potassium metabisulphite was employed in an attempt to maintain an active germicidal condition throughout storage. The grapes were stored at about 33° F., and were examined after 16 or 20 weeks on the basis of percentage of saleable grapes, prevalence of mould, and tasting tests. The most promising results were obtained by overwrapping with a rubber hydrochloride film having a "window" of cellulose acetate (to prevent accumulation of carbon dioxide), in conjunction with the maintenance of a very low partial pressure of sulphur dioxide within the package; both ordinary impregnated cushions and metabisulphite tablets were suitable sources of sulphur dioxide. Of the aqueous dips tested, Dovicide C, at a concentration of 1,000 p.p.m., gave good results, and ranked second to the overwrapping and sulphur dioxide treatment.

3937. WALKER, W. A., WORTHINGTON, O. J., AND WIEGAND, E. H.

More storage time for grapes. II.

Ice and Refrig., 1951, 120 (6): 31-3, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1448.

In further experiments [see abstract above], results obtained with Emperor grapes were confirmed; in addition, the effect of rinsing and not rinsing the grapes after dipping, of a detergent wash alone, and of different concentrations of dipping solution were investigated. Results showed that the storage life of grapes can be significantly prolonged by wrapping in transparent films and placing a cushion impregnated with sodium bisulphite in the lug boxes. Dipping in Dovicide C (1,000 and 3,000 p.p.m.) and rinsing in fresh water, then wrapping in polyethylene, or, with the higher concentration of Dovicide C, in pliofilm with a cellulose acetate window, appeared to be a treatment with promising commercial application. In all the dipping treatments, there was some loss of "bloom". The inhibition of mould growth was due entirely to the fungicide, and not to the physical washing action of the wetting agent; washing grapes in the wetting agent alone made them more susceptible to mould infection. Wrapping the grapes in transparent film prevented loss of moisture and shrivelling during storage; since the films were permeable to respiratory gases, no off-flavours due to anaerobic respiration were observed.

3938. REAR, J. C.

Ice extends storage of grapes.

Ice and Refrig., 1951, 120 (4): 11-13, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1408.

In California ice is being used for the pre-cooling and cool storage of grapes. Grower-operated stores are built either on the ranch or close to the packing-house or the distribution point. A brief account is given of the design and construction of these stores.

3939. BURGER, I. J.

How to make dipped raisins.

Dec. Fruit Gr., 1953, 3 (3): 16-17.

Points considered are: condition of grape, picking, dipping, dipping solution, concentration of solution, drying, sorting, and the gathering of dried raisins.

Nuts.

(See also 3823, 3951d, h, 4376.)

3940. SERR, E. F., AND KESTER, D. E.

New almond varieties released.

Calif. Agric., 1953, 7 (6): 5, illus.

Davey is a vigorous, good-yielding, early-maturing, soft-shell Nonpareil × Sans Faute hybrid and is a good pollinator for Nonpareil.

3941. BURLINGAME, B. B., AND VOLZ, A. G.

Almond harvesting. Mechanization promising in reducing harvesting costs.

Calif. Agric., 1953, 7 (6): 4, illus.

Data collected in 1952 suggest that mechanical picking can reduce almond harvesting costs but not by more than \$20 per acre. The change-over to mechanical picking involves considerable capital outlay.

3942. KAPETANOVIĆ, N.

Prilog poznavanju pitomog kestena u slivu gornje Neretve. (A study of sweet chestnuts in the upper Neretva valley.) [French summary 1 p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (10): 145-55, bibl. 8, illus.

A description is given of the climatic, edaphic and ecological conditions of the sweet chestnuts in this valley.

3943. NIKOLOVSKI, T.

A contribution to knowledge on the sweet chestnut forests of Macedonia. [Serbian, with German summary $\frac{3}{4}$ p.]

God. Sum. Nauč. Opit. Inst. Skopje, 1951, 1: 187-94 + tables, bibl. 20 [received 1953].

Chestnuts grow in the Macedonian mountains from about 200 to 1,100 m. above sea level; the best stands, however, are found between 600 and 900 m. exposed to the north-west. Plant associations in the chestnut forests are discussed.

3944. VIEITEZ, E.

Estudios sobre la reproducción vegetativa del castaño. I. Enraizamiento en el acodo alto mediante el empleo de fitohormonas. (Studies on vegetative propagation of the sweet chestnut. I. The use of growth promoting substances to induce rooting in marcots.) [English summary 1 p.]

An. Edaf. Fis. veg. Madrid, 1953, 12: 337-56, bibl. 8, illus.

In marcotting experiments with 3- to 4-year-old sweet chestnuts at the Misión Biológica de Galicia at Pontevedra in 1952 the following growth promoting substances were employed at different concentrations in lanolin paste and in different mixtures: beta indoleacetic acid (IAA), alpha naphthaleneacetic acid (NAA), beta indolepropionic acid, 3 indolebutyric acid (IBA), 2,4-D and 2,4,5-T. The marcotting was carried out between early May and early July on branches in their first year of growth, the paste being applied to a 3-4 cm. long section of branch which was then covered with damp sphagnum moss and plastic material. The results are described in detail. They were very varied and ranged from rapid root development to death. Quick rooting was obtained at the beginning

of spring growth with (1) 10 mg./g. IBA; (2) 4 mg./g. IAA plus 4 mg./g. 2,4-D; (3) 5 mg./g. IAA plus 5 mg./g. NAA plus 1 mg./g. 2,4-D.

3945. ULRICH, R.

Entreposage des châtaignes et des fraises en atmosphère contrôlée. (**Storage of chestnuts and strawberries in a controlled atmosphere.**) *Proc. 8th int. Congr. Refrig., Lond., 1951*, 1953, pp. 422-5, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1423.

Small-scale tests are described. Results showed that it should be possible to keep chestnuts fresh from October until April if, as soon as possible after harvest, they are stored at 0° C., in an atmosphere containing about 30% of carbon dioxide, at a relative humidity of about 80%. On removal from store, the chestnuts should be used without delay. If strawberries of the varieties studied are sound, very fresh, incompletely ripe, and arranged in thin layers, it should be possible to store them for about a month at 0° C. with a very high relative humidity, in an atmosphere without carbon dioxide and with a low oxygen content.

3946. KUHLMAN, G. W.

Cost of producing filberts in the Willamette Valley, Oregon.

Cost of producing walnuts in Oregon.

Stat. Bulls. Ore. agric. Exp. Stat. 517 and 518, 1952, pp. 47 and 47 resp., illus.

The specific purpose of these studies was to determine (1) the over-all cost of producing filberts and walnuts in Oregon; (2) the factors that have a major influence on cost of production; and (3) the cost of growing filberts and walnuts to bearing age (6 and 12 years respectively).

3947. OLDÉN, E. J.

Frysingsförsök med hasselkvistar vid Balsgård vintrarna 1950-51 och 1951-52. (**Freezing trials with hazel twigs at Balsgård during the winters 1950-51 and 1951-52.**) [English summary 1½ p.] *Sver. pomol. Fören. Årsskr.* 1952, 1953, 53: 76-92, bibl. 6, illus.

Fourteen hazel varieties and about 30 wild types of *Corylus avellana* were used in these freezing trials with a view to selecting hardy plants for breeding purposes. The temperatures applied ranged from -12 to -36° C. The tabulated data show, among other things: that the wild types can stand a 5°-10° C. lower temperature than the cultivated varieties; that hardiness decreases towards the end of the rest period (in Sweden, end of February to early March); and that the critical temperature for catkins of the large-fruited varieties is -18° to -20° C. during the rest period. Germination experiments with pollen that had been exposed to freezing were also made.

3948. HUNTER, J. H.

Pecan variety performance before and after orchard was grazed.

Bett. Crops, 1953, 37 (6): 17-20, 39-40, illus.

Results obtained in Georgia in a block of pecan trees of 3 varieties (Stuart, Moore and Schley) under 2 successive cultural practices are recorded. In the first period winter cover crops were grown and the land was cultivated during the summer, while in the second

grazing crops were grown throughout the year. The growth of all 3 varieties was greater when grazing was practised. Yields of the first 2 varieties were also higher when the block was grazed, the quality of the kernels was on the whole better but the nuts produced were smaller. The third variety (Schley) was not very promising.

3949. GERRITSEN, C. J.

De rassenkeuze bij de walnoot. (The choice of walnut varieties.)

Meded. Inst. Vered. Tuinbouwgew. 45, 1953, pp. 43, illus.

Notes on the qualities which a good walnut variety should possess and the availability of such varieties in Holland are followed by descriptions and illustrations of the nuts of recommended and rejected Dutch varieties and some French and German varieties which would probably be suitable for growing in Holland.

3950. MAURER, K. J.

Die Walnuss-Freilandveredlung. (The grafting of walnuts in the open.)

[*Publ.*] *Verlag Bayer. Landesverband f. Obst- u. Gartenb., Münch.*, 1951, pp. 30, illus. [received August 1953].

The technique of bud-grafting walnut rootstocks in the open is described in detail and copiously illustrated by photographs. Observations at Geisenheim have shown that young trees worked in the open make more vigorous growth in the nursery than do bench-grafted trees. [See also *H.A.*, 21: 298.]

Noted.

3951.

a. CECCARELLI, G.

Il primo vino di un diibrido di seconda generazione mendeliana. (**The first wine of a mendelian second generation dihybrid.**) *Riv. Vitic. Enol.*, 1953, 6: 173-5.

b. DARROW, G. M., SCOTT, D. H., AND GALLETTA, G. J.

New blueberry varieties for New Jersey.

Bull. N.J. agric. Exp. Stat. 767, 1952, pp. 7, illus.

c. DOEHLERT, C. A.

Propagating blueberries from hardwood cuttings.

Circ. N.J. agric. Exp. Stat. 551, 1953, pp. 7, illus.

A revision of circular 490 [see *H.A.*, 15: 1501].

d. DUNSTER, B. P.

Propagating hickories.

Gdnrs' Chron., 1953, 134: 45.

From stratified seed sown in pots in February.

e. LUGUE L., J. A.

Los sistemas de conducción de vid mas generalizados en la provincia de Mendoza. (**Systems of vine training used in the province of Mendoza.**)

Bol. Prod. Foment. agric., 1952, 4 (32): 2-11, illus.

- f MANZONI, L.
Il tralcio ed il suo sviluppo. (Development of the vine shoot.)
Riv. Vitic. Enol., 1953, 6: 131-5, bibl. 8.
A short review article.
- g MOORE, R. C., AND OBERLE, G. D.
French-American hybrid grapes in Virginia.
Fruit Var. hort. Dig., 1953, 8: 5-8, illus.
- h N.S.W. DEPARTMENT OF AGRICULTURE,
DIVISION OF HORTICULTURE.
Walnut growing.
Agric. Gaz. N.S.W., 1953, 64: 171.
Juglans regia.
- i VAARAMA, A.
The effect of aneuploidy upon the progeny of an autotetraploid *Ribes nigrum*.
Maataloust. Aikakausk., 1953, 25: 77-83, bibl. 15.
Work at the State Horticultural Institute, Piikkio.
- j ZIELINSKI, Q. B.
Chromosome numbers and meiotic studies in *Ribes*.
Bot. Gaz., 1953, 114: 265-74, bibl. 23, illus., being *Tech. Pap. Ore. agric. Exp. Stat.* 721.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

3952. COMITÉ NATIONAL POUR L'ÉTUDE DE LA CULTURE FRUITIÈRE, BELGIQUE.

Rapport Général, Comité National pour l'Étude de la Culture Fruitière, 1950-52, 2me Section. (General Report, National Committee for the Study of Fruit Growing, 1950-1952, 2nd Section), pp. 33 (Gorse Research Centre) and pp. 17 (La Roncière Research Centre).

Gorse Research Centre. An account is given of biological and control studies on various diseases and pests. *Venturia inaequalis*: curative (but not preventive) treatment could under certain conditions permit a reduction in the number of treatments required for complete control. *Podosphaera leucotricha*: preventive control experiments were encouraging, wettable S giving good results. Mites: *Metatetranychus ulmi* and *Bryobia praetiosa*. *Cydia pomonella*: thiophosphates, DDT and lead arsenate. Leaf miners: *Lyonetia clerkella* and others. *Hoplocampa*: thiophosphate and gammexane. *Operophtera brumata*: experiments proved that young caterpillars are carried by the wind. *Subsidiary studies* included hibernation, and apple and pear spray programmes, phenology, meteorology, manuring (borax, urea) and chemical thinning. *La Roncière Research Centre.* This fruit tree pathology station was opened in March 1951 at the Station d'Application Agricole et Horticole de l'Union Chimique Belge at La Hulpe by agreement between U.C.B. and I.R.S.I.A. and within the framework of the Comité National pour l'Étude de la Culture Fruitière. *Venturia inaequalis*: Research on infection and methods of prevention of the development of perithecia on dead leaves shows that 0.75-1.25% ammoniacal DNOC has distinct efficacy but not lime-sulphur or Cu oxychloride. *Fertilizers*: optimum proportions of N, P and K for apples and pears; placement. [See also separate abstracts.]

3953. KEARNS, H. G. H.

Important pests of apples 1920-50.

MARTIN, J. T.

Insecticides and fungicides in fifty years of fruit culture.

KEARNS, H. G. H., AND MORGAN, N. G.
Fifty years of fruit spraying methods and machinery.

Science and Fruit, 1953, pp. 213-25, bibl. 21; pp. 236-45, bibl. 41; and pp. 265-75, bibl. 16, illus., respectively.

These three important papers give an illuminating account of pests important in the west of England, of the development of materials important in the control of pests and diseases and of the contribution made by Long Ashton in devising ever increasingly efficient machinery for the application of these materials in the last 30 years.

3954. WILKINS, V. E.

Report of the working party appointed to consider the danger to European countries of pests and diseases which may be introduced from outside, and to recommend appropriate preventive measures. [French and English texts.]

Paris, 14 Rue Cardinal Mercier, 1951, pp. 11, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 224.

An appendix to this report lists some extra-European plant pests and diseases which, it is considered, would cause serious losses if they became established in Europe, with recommendations as to how they should be kept out. The introduction of peach yellows virus and other virus diseases of stone fruit trees should be prevented by field inspection in the exporting country and post-entry quarantine. Thus *Prunus americana* and *P. virginiana* should be excluded by embargo, whereas to prevent elm phloem necrosis virus and rose wilt virus and other virus diseases of these hosts, there should be post-entry quarantine.

3955. LING, L.

Digest of plant quarantine regulations.

FAO Develop. Pap. Agric. 23, new edition 1952, pp. 164.

Abstracts from laws and regulations of 40 countries governing the importation of plant material.

3956. RACICOT, H.-N., AND JULIEN, J.-B.

Maladies des petits fruits. (Diseases of small fruits.)

Agriculture, Quebec, 1952, 9: 380-6, being *Contr. Minist. Agric., Sci. Serv., Div. Bot. Path., Ottawa*, 1222.

Notes on the more important virus, fungal and physiological diseases of small fruits in Quebec and their control.

3957. FRANGOPOULOS, A. M.
Control of some vine diseases and pests in Egypt.
Plant Prot. Overs. Rev., 1953, 3 (4): 13-18, bibl. 3.

Notes are given on the control of hamsin wind injuries which consist of wilt, covering by sand, and wind breakage; of the ill effects of high water table and excessive salt by drainage and flooding to leach out salts; and of *Peronospora viticola*, *Uncinula necator*, cotton leaf worm, and *Polychrosis botrana*.

Disturbances of nutrition or of unknown origin.
(See also 4740.)

3958. ROACH, F. A.
Some observations on the occurrence and correction of nutrient deficiencies in fruit trees and bushes.
N.A.A.S. Quart. Rev., 1953, No. 20, pp. 363-8, and abridged version in *Grower*, 1953, 40: 121-3.

Notes are given on Cu and Zn deficiency and their correction and on the use of foliage sprays of urea for N deficiency in the N.A.A.S. South-Western Province. Cu deficiency has been observed in pear (varieties and symptoms listed), apple (which appears less susceptible) and almond, but never on plum, even on Cu-deficient soils. The threshold deficiency level in soil is 2 p.p.m. Tree-spraying with a Cu oxochloride spray at half the summer fungicide strength or with 0.05% Cu sulphate during the last week of May gives good control in the year of application. Soil applications of 25-50 lb. Cu sulphate per acre are being successfully employed but are unlikely to give good results in alkaline soils. To Zn deficiency apples and cherries appear more susceptible than pears, while plums seem less affected. Leaf analyses are given. A single tree-spray of 4.0% Zn sulphate in February or of 0.1% in spring when sufficient leaf has developed gives good control for at least 2 seasons. Experiments with urea foliage sprays on apple, pear and black currant in 1950-52 are described and suggestions and recommendations are made.

3959. MULDER, D.
Voedingsziekten bij fruitgewassen. (Nutritional disorders of fruit crops.) [English summary 1½ p.]
Tuinbouwvoorlichting 1, 1953, pp. 64, bibl. 14, illus., fl. 1.75.

An account of the functions of the 6 chief nutrient elements and 6 trace elements is followed by detailed descriptions of the symptoms of deficiency and excess of nutrient elements in fruit crops. The causes of nutritional disorders, methods of diagnosis, effect on fruit quality and methods of control are also dealt with. There are 24 handsome and useful coloured plates, illustrating deficiency and other symptoms in leaves.

3960. NATIVIDADE, J. V.
Sobre a nutrição das fruteiras. II. (The nutrition of fruit trees. II.) [English and French summaries ½ p. each.]
Bol. Junta nac. Frut. Lisbon, 1951, 11: 7-21, illus. [received 1953].

The symptoms and treatment are described of deficiencies of Mg, S, B, Fe, Mn, Zn and Cu in fruit trees.

3961. HAYTER, C. N.
Boron deficiency of pears.
Rhod. Fmr., 6 May, 1953, p. 32.

Boron deficiency has been found responsible for the development of hard, brown centres in maturing pears of the varieties Le Conte and Keiffer Hybrid grown below 5,000 ft. in Southern Rhodesia. Forking in borax, at 4 oz. to 1 lb. per tree depending on size, immediately after harvesting has usually corrected the trouble in the succeeding crop. Later applications may not be effective for another year.

3962. ATKINSON, J. D., AND BOLLARD, E. G.
Note on manganese deficiency in apple, plum and quince.
N.Z. J. Sci. Tech., Sect. A, 1953, 35: 19-21, bibl. 4, illus.

In apples and plums affected by Mn deficiency under New Zealand conditions a small proportion of leaves develop marginal and interveinal chlorosis, usually when the fruit is about half grown. In quinces a higher proportion of leaves, particularly those that form first, show interveinal chlorosis. In small-scale trials on trees growing in a fertile soil with pH values of 6.3-7.2, Mn sprays corrected the trouble. A suggested formula is 5 lb. manganese sulphate plus 4 lb. hydrated lime to 100 gal. water, which should be applied soon after fruit set to avoid unsightly residues.

3963. BOLLARD, E. G.
Severe potash deficiency in young peach trees.
N.Z. J. Sci. Tech., Sect. A, 1953, 35: 39-44, bibl. 1, illus.

Potash deficiency was found to cause poor growth and severe marginal necrosis of the leaves of young peach trees in the Auckland district. Dressings of 5 cwt. of potash per acre were required to rectify the disorder. Tissue tests showed differences in potassium status of affected and healthy trees. [Author's summary.]

3964. DELMAS, H.-G.
Sur un cas de dépérissement des pommiers dans la haute vallée du Tech (P.-O.). (A case of decline in apple trees in the upper valley of the Tech (Eastern Pyrenees).)
C.R. Acad. Agric. Fr., 1953, 39: 473-6.

20-year-old Reinette du Canada apples on seedling stock showed symptoms of Zn deficiency which was confirmed by foliar analysis. A dormant spray of 5% unneutralized Zn sulphate caused the disappearance of the symptoms.

3965. BOLLARD, E. G.
Zinc deficiency in peaches and nectarines.
N.Z. J. Sci. Tech., Sect. A, 1953, 35: 15-18, bibl. 2, illus.

The occurrence of zinc deficiency in peach and nectarine trees in Central Otago is recorded. Symptoms consist of leaf chlorosis, reduction in leaf size, rosetting and die-back of leaders. When leaf chlorosis is the only symptom, confusion with manganese deficiency is possible. Foliage sprays of 3 lb. zinc sulphate mixed with 4 lb. hydrated lime in 50 gal. water largely rectified the disorder. [Author's summary.]

3966. BOLLARD, E. G.

Zinc deficiency in pears.

N.Z. J. Sci. Tech., Sect. A, 1953, **34**: 548-50, bibl. 5, illus.

In a case of severe Zn deficiency in 12-year-old Williams' Bon Chrétien pears on a slightly acid soil in Central Otago normal growth was restored by spraying the trees once in March, July or November with 3 lb. Zn sulphate plus 6 lb. hydrated lime in 50 gal. water. It is suggested that an annual spray would maintain normal growth.—Fruit Res Stat., D.S.I.R.

3967. BRUNO, A.

La richesse en eau du milieu vital et les signes de carence zincique. (Abundant water supplies and signs of zinc deficiency.)

C.R. Acad. Agric. Fr., 1953, **39**: 409.

Brief examples are given which show that abundance of water prevents or retards the appearance of Zn deficiency symptoms in pear trees, whereas lack of water may cause signs of unsuspected Zn deficiency to appear.

3968. HOORN, G. H.

Vergroeiingen van vruchten. (Abnormal fruit development.)

Fruittelt, 1953, **43**: 652-3.

Illustrations and notes are given on 7 types of malformation in pear and 1 in apple.

3969. CERULIS, A.

Een nieuwe ziekte op de perelaars. (A new disease of pears.)

Cult. Hand., 1953, **19**: 344.

In Belgium, particularly in the Limburg and Brabant areas, there have been several reports of pear trees suddenly dying off after blossoming, following normal development in the early spring. Trees of all ages have been affected and the victims were distributed irregularly throughout the orchards. Durondeau was the variety most commonly affected but the phenomenon was also reported on Conference and Doyenné du Comice. The cause is not known but is thought to be physiological. Watering with nitrate solution or spraying with carbamates of iron or other trace elements are suggested as control measures.

3970. DERMINE, E., AND MONIN, A.

Recherches sur les causes du rougissement des feuilles de la variété de poirier Durondeau. (Research on the cause of leaf reddening in the Durondeau pear.)

Fruit belge, 1953, **21**: 97-103, illus.

A disorder of pears, which has occurred sporadically for many years, has recently been reported from many parts of Belgium on some of the chief commercial pear varieties, notably Durondeau, Conference, Williams' Bon Chrétien, Comtesse de Paris, Jeanne d'Arc, Précoce de Trévoux and Triomphe de Vienne. The symptoms are early autumnal reddening of the leaves (August), weak growth and poor keeping qualities in the fruit. The disease is being investigated on Durondeau at the Station d'Amélioration des Plantes at Gembloux. The possible causes in descending order of probability are virus, physiological disturbance at graft level, an undetected insect or fungal pest.

3971. BOLLARD, E. G.

Note on internal-browning of quince fruits.

N.Z. J. Sci. Tech., Sect. A, 1953, **35**: 63-4, illus.

In the disorder described fruits of Smyrna quinces show browning of the flesh, external to the core region, while still on the trees or shortly after picking. Attempts to control the disorder by spray applications of trace elements have been unsuccessful. Losses can be reduced by early picking, provided this is followed by early utilization.

3972. STALÉ, J., AND FAVRE, C.

Le dépérissement des fraisières de la Plaine du Rhône. Un des responsables: le sol. (The soil as a factor in strawberry decline in the Rhône Valley.)

Rev. romande Agric. Vitic., 1953, **9**: 57-9, illus.

The chief causes of unsatisfactory growth in strawberries in Valais are either the lack of crumb structure through deficiency of clay and humus or the presence of a superficial clay layer in the alluvial soils, and a high water table. A symptom is temporary chlorosis which disappears during the summer; in more serious cases the plants lose vigour or die after good early growth and abundant flowering. The ill effects can be greatly limited by thorough cultivation and manuring, levelling where the water table is high, drainage combined with irrigation, and cultivation in single rows rather than beds to facilitate the incorporation of fertilizers.

3973. COOMBE, B. G., AND ALLAN, H. R.

Grape bunch stalk rot.

J. Agric. S. Aust., 1953, **56**: 418, 422.

A grape bunch stalk rot of unknown cause has been observed in South Australia during the last 2 years. The symptoms occur in November-January. They are soft, dark, water-soaked areas on the peduncle, usually encircling it, and wilting, death and abscission of the distal part of the bunch. The rot has been most prevalent on the varieties Grenache and Doradilla.

Climatic factors.

(See also 4095x, 4486, 4510.)

3974. FRITZSCHE, R., AND NÄF, J.

Bessere Aussichten für eine erfolgreichere Spätfrostbekämpfung? (Better prospects for better control of spring frosts?)

Schweiz. Z. Obst- u. Weinb., 1953, **62**: 319-22, illus.

Experience in 1953 made it clear that, in view of the practically permanent air currents, heaters and smoke generators are inadequate means of spring frost control under Swiss conditions. In the Italian South Tyrol in the summer of 1953 the authors saw an experimental irrigation plant which had been used for frost protection during the spring, covering about 400 m² of a large orchard of fully grown $\frac{1}{2}$ -standard trees. The installation consisted of rotating sprinklers with a range of 14 m., which were mounted on 6 m.-high pipes erected at distances of 20 m. In the critical night during spring the temperature at soil level had dropped to below 0° C. at 10 p.m.; irrigation was begun at 12.30 a.m. and continued to 10 a.m. Later in the

summer all the trees of the treated plot bore an almost full crop, whereas the rest of the plantation bore no fruit. Even within the treated plot, however, the bottom branches were bare, showing that the frost "lake" had risen to their level before irrigation became effective.

3975. KRITSKAJA-KRJUKOVA, L. M.

The protection of fruit trees from spring frosts. [Russian.]

Priroda, 1953, 42 (4): 104-7, bibl. 1, illus.

In a brief review of methods of frost control it is shown that the potassium salt of α -naphthaleneacetic acid delayed the opening of buds on pome and stone fruits. The most suitable time for applying it to get results the following year was at the end of the growing period of the shoots when flower bud initiation was just beginning. For pome fruits this was during the first 10 days of July in the Crimea and a little later farther north. Optimum amounts were 250 to 300 mg./l. Apple and pear blossoming was retarded by 5-7 days, apricot and peach blossoming by 9 days. [For a very similar article and abstract see *H.A.*, 21: 3293.]

3976. LOEWEL, E., FRANKEN, E., AND VAN EIMERN, J.

Frostschutzversuche durch Räuchern und Heizen. (Experiments on frost protection by smoke and heating.)

Mitt. ObstVersuchsrings Jork, 1953, 8: 140-7, illus.

During the nights of 20-21 and 21-22 April, 1953, the effect was compared of smoke and heating respectively on the temperature in a small-fruit plantation situated on a slope in a valley of the Alte Land. Smoke produced from Fumex cartridges was unsatisfactory, as it raised the temperature by only 0.5° C. and was too expensive in its application. On the second night fires (peat, sawdust and oil), spaced 8 m. apart, raised the temperature by 1-2° C. (maximum 2.5° C.) during periods in which the wind velocity did not exceed 1 m./sec.

3977. BAKER, C.

Baled straw for orchard heating.

Gdnrs' Chron., 1953, 134: 6.

The use of baled straw as fuel for frost prevention is discussed and some data on heat value and comparative costs are given. An average bale of straw (90 lb.) would normally burn for about 5 hours; the gross heat output would be equivalent to the gross amount of heat given out by oil burning at the rate of about 0.6 gal. per hour. Further information from growers with experience in the use of straw for orchard heating is requested.

3978. DALL'ARA, A.

Prove con vapori di metabisolfito di ammonio per prevenire i danni della brina nella zona dell'Imolese. (Tests with ammonium metabisulphite vapour for preventing late frost damage in the Imola district.)

Riv. Ortoflorofruttic. ital., 1953, 37: 90-3, illus.

The results of trials in March 1950 were satisfactory but the materials were much more expensive than Stacchini smoke-candles or the commonly used wet straw or vine shoots.

3979. BÖMEKE, H.

Gedanken zum diesjährigen Junifruchtfall.

(Observations on this year's June drop.)

Mitt. ObstVersuchsrings Jork, 1953, 8: 166-9.

Apple varieties in the Alte Land, which were in bloom during the period 2-6 May, 1953, dropped an unusually high percentage of their fruit in June. Apparently, the cold weather on 11 May either killed the embryos or inhibited their further development with the result that the ordinary June drop was followed immediately by the abscission of cold-injured fruits. The incidence of a fairly general calyx rot is also attributed to cold damage.

3980. FISCHER, R.

Über Pfirsichblättrigkeit der Zwetschke.

(A "peach leaf" disease of damsons.)

Pflanzenarzt, 1953, 6: 2.

The formation of "peach" leaves and leaf rosettes on zwetsche trees was found to be due to frost injury and not to virus infection. At the base of stunted shoots the pith always showed browning in the region of the buds. O.J.

3981. LINDEN, R.

Les fraisières après les gelées tardives.

(Strawberries after late spring frosts.)

Bull. hort., Liège, 1953, 8: 211-17, illus.

Injuries to strawberries, caused by a frost in May 1953, are described and illustrated. The reaction of 14 varieties is discussed, Auchincruive Climax being most resistant, Huxley's Giant being medium and Royal Sovereign very susceptible.

3982. PEYER, E.

Die Frostschäden in den Reben und die Behandlung der geschädigten Stöcke. (Frost damage to vines and the treatment of injuries.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 206-9, illus.

On the night of 10 May, 1953, an 8 hours' frost of -8° C. killed the young growth in most Swiss vineyards. The vines were well advanced at the time and all the preventive measures taken, such as heating and covering the plants, failed to give protection. The loss to growers is therefore exceptionally severe. Injured vines are illustrated and instructions are given on the pruning treatment to be adopted.

3983. HART, H. R.

A frost alarm with adjustable temperature setting.

J. hort. Sci., 1953, 28: 160-2, illus.

A brief description of a new type of alarm made at the Dominion Physical Laboratory, D.S.I.R. N.Z.

3984. WILNER, J.

A study of the effects of desiccation and low temperatures on the extent of winter injury to certain woody plants.

Diss. Abstr., 1953, 13: 150, *Publ.* 4890 of 57 pages.

Fifteen woody plants representing species and varieties used on the Canadian prairies as windbreaks and for fruit production were studied at University Farm, St. Paul, Minnesota. Twigs of these trees were exposed to outdoor conditions from 20 December to 16 March.

At the end of 63 and 87 days, freezing injury, based on the extent of tip killing in inches, was studied both on twigs exposed to outdoor temperatures and on twigs which had subsequently been given an additional artificial low temperature treatment down to -45°F . It was found that desiccation occurred mainly at temperatures above freezing, indicating that considerable injury in the regions of the chinook winds might be due to desiccation, which might result from frequently occurring mild spells. The main differences in extent of tip killing were attributed to differences in tree susceptibility to low temperatures. *Caragana*, green ash and Dolgo apple withstood the lowest temperatures without serious tip killing. The artificial freezing test appeared to be a rapid and reliable guide to the hardness of woody plants.

3985. B., G.

Échaudage avant floraison. (Pre-blossom scald.)

Progr. agric. vitic., 1953, 140: 58-61.

A pre-blossom scald which affected vines in parts of the south of France in 1953 was due to high May temperatures. It occurred mainly in vigorous young plants, taking the form of peduncular necrosis and affecting up to half the bunches on the plant. The varieties which chiefly suffered were Morrastel-Bouschet, Carignan, Cinsaut, Terret-Bourret, Grenache and Maccabeu.

3986. GOOSEN, R. J.

Delayed foliation in sultana vineyards.

Fmg S. Afr., 1953, 28: 188.

Delayed foliation in sultana vines is a condition of which the symptoms are incomplete budding, production of abnormal leaves, lack of vigour in shoots, and fruit drop. It is due to late season warm weather followed by frosts. The following malpractices exacerbate it: inadequate manuring, autumn grazing, pruning while the leaves are still green, and discontinuation of irrigation to induce early ripening of grapes.

3987. UFFICIO TECNICO ANTIGRANDINE, VERONA.

La difesa antigrandine in Italia nell'anno 1952. Relazione tecnica riassuntiva a cura dell'Ufficio Tecnico Antigrandine, Verona. (Hail control in Italy in 1952. A short technical report by the Anti-hail Technical Department, Verona), 1953, pp. 56.

A brief description is given of the work of the Verona Anti-hail Technical Department which reports to the Minister on proposed experiments, gives advice and assistance to operators, and sponsors remote control firing experiments. Notes and data are given on the 63 projects carried out in 1952, which covered 420,000 ha. in 430 communes. Data include the total number of storms experienced during the campaign (477), the number of hailstorms before and after rocket firing (355 and 32), the number of rockets used (47,000), whether they exploded in or outside the cloud, and the cost. Compared with 1951 a higher proportion of rockets had an explosion-height of 1,500 m.; another improvement was the new firing method which enabled firing at some distance. Organizing problems and factors affecting cost are discussed. Of the 59 tests costed, 40 cost less than 1,000 l. per ha., 15 between 1,000 and 2,000 l., and the remaining 4 cost more than 3,000 l.

3988. RUI, D., AND ROMANELLI, O.

Quattro anni di sperimentazioni antigrandine in Italia. (Four years of anti-hail experiments in Italy.)

Grafiche Testi, Verona, 1953, pp. 8.

The anti-hail experiments have been placed under the control of the Minister of Agriculture and Forestry who has entrusted executive control to the appropriate organizations. Experimentation began in 1949 and has been successful. The area protected rose from 38,000 ha. in 2 provinces in that year to 420,000 ha. in 22 provinces in 1952. Explosive-carrying rockets are fired into and caused to explode in hailstorm clouds. Italian rockets made by Sipe of Milan and Italarazzi of Peschiera del Garda are now used. As a result of experience the original plan of a frontal line of firing sites has been abandoned in favour of a network uniformly covering the whole protection area. Regulations exist regarding the conduct of rocket-firing experiments, and the classification, manufacture, packing, transport, storage and use of rockets.

3989. GALLAY, R.

La protection des cultures contre la grêle. (The protection of crops against hail.)

Rev. romande Agric. Vitic., 1953, 9: 59-60, illus.

An account is given of new anti-hail experiments which have been put into operation in the Magadino plain in Switzerland, a locality in which anti-hail rockets have not been a success. The new technique consists of the introduction into the hail-forming layers of the atmosphere of great numbers of tiny particles of silver iodide to transform the supercooled water droplets into ice crystals too small to be dangerous. The generating apparatus consists of a burner and 2 tanks, one containing silver iodide dissolved in acetone and the other the combustible product (propane); the silver iodide, vaporized in the burner, is converted into solid particles on contact with the air. The generators are placed on the ground in positions in which there are ascending currents of air capable of carrying the silver iodide to the desired altitude. Fourteen posts have been established in the Maggiore-Lugano-Como area and they operate individually or in groups according to meteorological conditions.

3990. OELE, L. C., AND MEEUWSE, P.

Waterschade in de Zeeuwse fruitteelt. (Waterlogging damage to fruit in Zeeland.) *Fruitteelt*, 1953, 43: 552-3, illus.

The wet autumn of 1952 followed by heavy rains in early spring resulted in serious damage or even death of fruit trees and bushes on poorly drained soil in Zeeland. Observations are made on the types of soil and fruit most affected. Of the top fruits, apples on dwarfing rootstocks suffered most damage, especially Sterappel, the Cox group and James Grieve, while of the bush fruits raspberries, especially Malling Promise, and gooseberries, were most affected.

3991. BREMER, H.

Phytopathologische Probleme an Kulturpflanzen im Trockenklima. (Phytopathological problems in cultivated plants grown in a dry climate.)

Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 79-81, bibl. 7.

Several years' observations in Anatolia on the effect of drought on stone fruit, citrus, lilac, many vegetables and some other plants.

3992. RECKENDORFER, P.

Ein Beitrag zur Mikrochemie des Rauchschadens durch Fluor. Die Wanderung des Fluors im pflanzlichen Gewebe. II. Teil: Die sichtbaren Schäden. (A contribution to the microchemistry of fume injury by fluorine. The translocation of fluorine in the plant tissue. II. Visible injuries.*) [English summary 9 lines.]

PflSch. Ber., 1953, 10: 112-24, bibl. 7.

A theory is developed regarding microchemistry of scorched spots on fluorine-injured leaves, in comparison with non-discoloured parts of the foliage. An assessment of damage would be based on such microchemical findings. A concrete case of a cherry tree is discussed which grew at a distance of 1.5 km. from a source of F fumes.

Viruses.

(See also 3781, 4095g, j, 4096c.)

3993. MILBRATH, J. A.

Selecting stone fruit trees free from virus diseases.

Stat. Bull. Ore. agric. Exp. Stat. 522, 1952, pp. 27, bibl. 12, illus.

The results of 10 years' work on methods of improving stone fruit nursery stock are reported. Topics discussed are procedure for selecting virus-free trees as sources for nursery propagation, methods developed for indexing stone fruit trees for latent viruses, the value of using indexed virus-free trees, the development, use and advantages of virus-free mother block scion orchards, and desirable selections of sweet and sour cherries and their index history as regards virus.

3994. CHAMBERLAIN, E. E., ATKINSON, J. D., AND HUNTER, J. A.

Note on the systemic nature of apple-mosaic virus in apple trees.

N.Z. J. Sci. Tech., Sect. A, 1953, 34: 551-2, bibl. 2.

A survey was conducted to determine whether budwood for propagation taken from those parts of infected Jonathan and Golden Delicious trees not showing symptoms of apple-mosaic would give rise to healthy trees. The virus was found to be systemic.—D.S.I.R., Auckland.

3995. KUNZE, L.

Die Pfeffinger Kirschbaum-Krankheit auch am Mittelrhein. (The Pfeffinger cherry disease in the middle Rhine district.)

Reprinted from *Pflanzenschutz*, 1953, No. 1, pp. 4, bibl. 15, illus.

The presence of the Pfeffinger disease has now been discovered in cherry orchards in the so-called "Vorgebirge", an area on the left bank of the Rhine between Bonn and Cologne. The symptoms are described and illustrated. Various symptoms of unknown origin exhibited by cherries and peaches in other regions are also described. Grafting experiments are in progress

at Berlin-Dahlem to test the virus nature of these disorders.

3996. THIEM, H.

Über Abbaukrankheiten bei Süß- und Sauerkirschen. (Degeneration in sweet and sour cherries.)

NachrBl. dtsh. PflSchDienst, Braunschweig, 1953, 5: 65-70, bibl. 4, illus.

A close inspection of cherry orchards in certain areas of Western Germany has shown that virus diseases are more widespread than had been suspected. Illustrated descriptions are given of the symptoms observed on Frühe Ludwigs and on some other sour cherry varieties. The "spur rosette" disease (Rosettenbüschelkrankheit) observed on sweet cherries in several locations has many features in common with the Dutch Eckelrade and the Swiss Pfeffinger disease. Reference is made to the death of cherries in the Bergstrasse area.

3997. ANON.

Mosaic disease of peaches—its cause and control.

(Publ.) *Bur. Ent. Plant Quar., U.S. Dep. Agric. PA 224*, 1953, pp. 5.

Peach mosaic has already ruined approximately 400,000 peach trees in the United States and caused damage in excess of \$10 million. The most severe symptoms of the disease are found on freestone varieties of peach. The only known control is the early destruction of infected trees.

3998. OSTOJIC, N.

Die Šarka, eine gefährliche Viruskrankeheit der Zwetschgenbäume in Jugoslawien. (Šarka, a dangerous virus disease of damsons in Yugoslavia.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 225-7, illus.

Šarka, or pox of zwetschen, has been known in Bulgaria since 1932 and in Yugoslavia since 1937. The disease is of great economic importance, as zwetschente are widely grown in the Balkans and some of the most popular varieties are affected. The symptoms, spots of various shapes and colours, appear on leaves and fruits which may also show malformations. Generally it takes a few years for the infection to spread from one part of the tree to the whole crown. The disease has been transmitted experimentally by grafting and by *Anuraphis padi*, but the latter is apparently of little practical importance. The methods of control include a certification scheme enforced by the State.

3999. SKILES, R. L.

The strawberry viruses in Minnesota.

Diss. Abstr., 1953, 13: 149, *Publ.* 4881 of 77 pages.

Samples of 21 out of 23 strawberry varieties and 4 clones of Minnesota seedlings, when inarched on *Fragaria vesca* (E.M. clone) indicator plants, were found to be very heavily infected with virus. Brilliant was the only variety that indexed virus free. There were 6 distinct viruses isolated from the commercial plants on the basis of symptoms produced in the *F. vesca* plants. The symptom of each virus, respectively, was epinasty, chlorosis, dwarfing, chlorotic spotting, necrotic spotting, and ring spotting (a new virus symptom). These 6 viruses, either alone or in various

* For Part I see *H.A.*, 23: 395.

combinations, produced symptoms of 10 different types, designated as Minnesota virus classes, which were in turn compared with other classifications including the British system. Inoculation trials have shown that xanthosis and stunt viruses are not present in strawberries in masked forms. Evidence is presented indicating that June yellows, hitherto considered to be of genetic origin, is associated with virus infection. It is also shown that xanthosis virus predisposed plants to root-rot by *Rhizoctonia*.

Bacteria.

(See also 4740.)

4000. HELLMERS, E.
Plantebakterioser. (Bacterial diseases of plants.)

Horticultura, 1953, 7: 71-81.

A general discussion of bacterial diseases in stone fruit, vegetables and flowers, including control measures.

4001. U.S. DEPARTMENT OF AGRICULTURE.
Fire blight may lose its burn.
Rep. agric. Exp. Stats, U.S., 1952, 1953, p. 56.

At the Colorado Agricultural Experiment Station it was found that spraying with Dithane Z-78 at the 10% bloom stage and again at full bloom reduced the incidence of blossom and twig fire blight infection [not stated whether on apples or pears] by about 75%. In Missouri infections were markedly reduced on apple trees in full bloom sprayed with streptomycin or thiolutin. Calcium hypochlorite was found by Arkansas workers to be as effective in controlling fire blight as bordeaux mixture, and it did not russet the fruit.

Fungi.

(See also 4023, 40950, v, 4740.)

4002. MARSH, R. W.
Apple and pear scab. The mode of spread and methods of control of the diseases caused by *Venturia inaequalis* and *V. pirina*.
Science and Fruit, 1953, pp. 226-35.

Investigations on the life history, on control measures and their development in recent years with a glance into the future.

4003. CROXALL, H. E., AND OTHERS.
Spraying experiments against apple and pear scab at Long Ashton and in the West Midlands, season 1951.
J. hort. Sci., 1953, 28: 196-206, bibl. 3.

On Worcester Pearmain apples at Long Ashton in 1951, three applications of the thiocarbamate sprays, ziram (at 0.24%) or thiram (at 0.24%), gave a control of apple scab equal to that following the standard lime-sulphur programme (2% pre-blossom and 1% post-blossom). Fruit russetting was increased by the thiocarbamates. Three organo-mercury preparations, each used at 0.002% Hg, gave equal scab control, but these preparations were less effective than the standard lime-sulphur. The above results were paralleled in a non-replicated trial in Worcestershire made under conditions specially favourable to apple scab infection. A 0.125% heptadecyl glyoxalidine spray equalled lime-sulphur in apple scab control but showed no advantage

over 0.125% mixed glyoxalidines. A preparation of 0.1% trichloromethylthiotetrahydrophthalimide surpassed lime-sulphur in apple scab control and showed no phytotoxicity in trials at Long Ashton on Worcester Pearmain, Lane's Prince Albert and Stirling Castle. In a heavily-infected plantation of Doyenné du Comice pears in Warwickshire, four applications of the 0.125% mixed glyoxalidines reduced fruit infection to one-third of that on the unsprayed blocks and caused no damage to the crop. [Authors' summary.]—N.A.A.S. Plant Path. Lab., Evesham and Long Ashton Res. Stat., Univ. Bristol. [See also *H.A.*, 21: 3395.]

4004. MULDER, D., AND OTHERS.
Het schurftonderzoek in 1952. (Scab research in 1952.) [English summaries 9 lines and 1 p.]
Meded. Dir. Tuinb., 1953, 16: 184-213, 300-18, bibl. 3, illus.

Detailed reports are given by a number of Dutch workers on the extensive investigations that are being carried out in Holland on the possibility of controlling apple scab by curative, as opposed to preventive, sprays. The method involves determination of the time at which ascospore infection takes place, by means of moisture and temperature records, and the application of organic mercury sprays within 4-5 days after infection before summer spores are produced. Much of the work is concerned with the determination of infection periods and the length of the incubation period that follows. A rain indicator has been developed to record the moment at which the leaves become wet. Trials comparing the effectiveness of preventive and curative methods of control, and observations on the effect of organic mercurials on the tree are reported.

4005. DARPOUX, H.
Efficacité d'un produit à base de N. trichloromethylthiotétrahydrophthalimide sur la tavelure du poirier. (Efficacy of a N. trichloromethylthiotétrahydrophthalimide product against pear scab.)
Reprinted from *Phytiatrie-Phytopharm.*, 1952, No. 2, pp. 13-17, bibl. 4.

In 1951 and 1952 a N. trichloromethylthiotetrahydrophthalimide product (50% active ingredient) at 50 g. per 100 l. water was compared with 1% bordeaux mixture, phenylmercuritriethanol ammonium lactate at 0.125%, 0.75% fine wettable sulphur, 1% lime-sulphur, Fe dimethyldithiocarbamate (76% active ingredient) at 0.25% for the control of pear scab on Passe Crassane, Beurré d'Hardenpont and Doyenné du Comice. On Passe Crassane in 1951 it gave 78% first grade fruit compared with nil to 55% with the other products. Its residual effect was at least equal to that of bordeaux and was greater than that of the other products; it caused no burning.—Inst. nat. Rech. agron., Stat. centr. Path. veg., Versailles.

4006. WEBER, A., AND JØRGENSEN, H. A.
Forsøg med bekaempelse af aebleskurv efter løvfald samt undersøgelser over skurvens modningstid. (Investigations on scab control on fallen leaves and on the time of spore discharge.) [English summary 1½ pp.]
Tidsskr. Planteavl, 1953, 56: 443-69, illus., being *Beretr. Stat. Forsøgsvirks. Plantekult.* 469.

Fallen apple leaves with scab lesions, collected in orchards in the autumns of 1940-43 and 1948-52, were treated in the laboratory with 10% sulphate of ammonia, Puratized, two DNOC preparations and some other compounds. Microscopic examination showed that none of the chemicals killed all perithecia, but a considerable degree of control was achieved in every case. The sulphate of ammonia was applied at the rate of 20,000 litres/hectare, which would be excessive as a fertilizer application in the field, though in orchards with many leaves under the trees spring applications of the solution at lower rates in place of a dry fertilizer might be beneficial. Spore discharge was found to take place during a period from several weeks before to several weeks after blossom, according to season and variety. In these circumstances the establishment of a scab warning service cannot be justified in Denmark, especially as the climate varies from one small area to another. Attempts have failed to transmit the disease to young leaves on the tree by bringing them into contact with last season's infected leaves.

4007. BÖMEKE, H.

Automatische Sporenfalle. (An automatic spore trap.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 163-6, illus.

An automatic spore trap has been developed which records the flight of ascospores of *Venturia inaequalis* minute by minute for a period of 7 hours. The instrument is described and illustrated in detail.

4008. BAUMEISTER, G.

Das bisherige Verhalten des Fusikladiums in der Vegetationsperiode 1953. (The development of scab during the growing season 1953.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 73-7, 114-19, bibl. 2, illus.

Data are tabulated on the discharge of spores from scab-infected apple and pear leaves during the period 31 March-6 June, 1953, with notes on rainfall, temperature and leaf growth. Experiments showed that the perithecia have definite light requirements for the discharge of spores, the optimum illumination at Jork, on a rainy day, occurring between 11 a.m. and 1 p.m. No spores were caught in the traps before 8 a.m. or after dusk.

4009. FOSTER, H. H.

Organic fungicides in relation to brown rot control on peaches.

From abstr. in *Phytopathology*, 1953, 43: 290.

Six fungicides were compared in randomized single-tree plots of Shippers Late Red replicated 7 times. Each plot received 8 sprays, beginning at petal fall and ending 3 weeks before harvesting. In descending order of efficacy the 3 materials giving the best control of *Monilia fructicola* were (1) wettable sulphur at 6 lb. per 100 gal. water; (2) vancide 51 at 3 pints per 100 gal. for the first 5 sprays followed by wettable S—but vancide caused severe foliage injury; and (3) manzate at 1½ lb. per 100 gal.

4010. KRÖBER, H.

Contributions to the biology of the monilia diseases attacking deciduous fruits.

Höfchen Briefe (English Ed.), 1952, 5: 171-217, bibl. 64, illus.

An extensive study was made of the development *in vitro* of *Sclerotinia fructigena* and *S. laxa* and of their reactions to a variety of meteorological and chemical factors. Observations on the formation of conidia on the host by the two species are reported in detail. Inoculation experiments showed that neither of the species is specialized on pome or stone fruit. The prevalence of *S. laxa* on stone fruit and of *S. fructigena* on pome fruit is explained by differences in climatic conditions at blossom time.—Inst. f. Pflanzenkrankheiten, Bonn Univ.

4011. ANON.

Fleck of quince and pear.

Agric. Gaz. N.S.W., 1953, 64: 246-9, illus.

Fleck (*Fabraea maculata*) is a serious disease of quinces throughout New South Wales and also affects pears and loquats. The main symptoms are spotting of foliage and fruit, and premature leaf-fall. Control is by spraying with bordeaux or lime-sulphur at bud-burst followed by periodical applications of lime-sulphur.

4012. CANOVA, A.

Cascola parassitaria delle gemme di melo. (A parasitic bud-drop in apple.) [English summary 14 lines.]

Ann. Sper. agrar., 1953, 7: 355-67, bibl. 10, illus.

A parasitic bud-drop of apples caused by *Fusarium lateritium* var. *fructigenum* was observed in Italy for the first time in Reggio Emilia in 1950. The disease results in greatly reduced yields and retarded growth. The chief varieties affected are listed. Bud-drop begins in January and increases in intensity as growth flush approaches, fruit buds being particularly susceptible. A description is given of the external symptoms which are generally not obvious until shortly before the buds fall, and of the morphology and epidemiology of the parasite. In control trials infection was found to persist in the buds of small branches after fortnightly spraying with bordeaux mixture throughout the summer and autumn.—Lab. sper. Pat. veg., Bologna.

4013. COMITÉ NATIONAL POUR L'ÉTUDE DE LA CULTURE FRUITIÈRE, BELGIQUE.

Oïdium du pommier (*Podosphaera leucotricha*). (Apple mildew.)

Rap. gen. Com. nat. Ét. Cult. fruit., 2me Section, 1950-52, pp. 8-12.

Research at Gorse Research Centre on apple mildew during 1950-1952 included curative and preventive control experiments. It was concluded that curative control shows no promise (though wettable sulphur had some effect) since it destroys neither the mycelium, even when repeated at intervals, nor internal foci of infection. In preventive control experiments healthy trees were sprayed 11 times between the end of March and 1 August. Wettable sulphur gave good results, the rate of leaf infection being only 1% compared with 20-22% with permanganate, mercury and organics, and 27% in the control. The timing of treatments will be the subject of future study.

4014. TAYLOR, J.

The effect of continual use of certain fungicides on *Physalospora obtusa*.

Phytopathology, 1953, 43: 268-70, bibl. 5, illus.

Phylospora obtusa conidia from different sources were used in a slide toxicity study against several fungicides. A significant interaction between treatment and source of spores occurred in 2 tests indicating that the source of organism affected treatment results. This was noted especially in the 2-4-100 bordeaux mixture. There was a tendency for that material to cause greater inhibition of spores from orchards that had not been sprayed than of spores from orchards in which bordeaux mixture had been used over a long period of time. [From author's summary.]-Georgia Mountain Exp. Stat., Blairsville.

4015. LANDAR, E. G.

The rôle of microelements in increasing the resistance of apples to black rot. [Russian.] *Sad i Ogorod*, 1953, No. 8, pp. 19-21.

B and Mn applications increased the resistance of apples to black rot [*Phylospora obtusa*] both during the season of treatment and the following year.

4016. SPANGELO, L. P. S., AND BOLTON, A. T.
Suggested infection scales for roguing strawberry seedlings susceptible to *Mycosphaerella fragariae* and *Diplocarpon earliana*.

Phytopathology, 1953, 43: 345-7, illus., being *Contr. exp. Fms Service* 801 and *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, 1228.

Six infection classes for leaf spot and leaf scorch of strawberry are illustrated by photographs. It is suggested that such clearly defined infection scales would standardize disease readings and make comparison easier.

4017. STALDER, L.

Untersuchungen über die Graufäule (*Botrytis cinerea* Pers.) an Trauben. I. Mitteilung. (Studies on grey mould of grape vine. I.) [English summary $\frac{1}{2}$ p.] *Phytopath. Z.*, 1953, 20: 315-44, bibl. 22, illus.

Many years' attempts to control grey mould of grapes in the field have failed, although *Botrytis cinerea* spores were found to be as sensitive to copper as are *Peronospora* spores, and although the fungicides tested gave good results in the laboratory. The reasons for this failure may be twofold: (1) The berries burst after rain, as a result of which the copper is partly inactivated by the exuding juice and germination of the conidia is stimulated. (2) In varieties with closely spaced berries the fungicide does not penetrate into the interior of the bunch, where the mould lives saprophytically as in a moist chamber, until the ripe berries are attacked at the point of attachment of the pedicel. The variety Gutedel was found to be more resistant than three other varieties examined, but susceptibility increased with maturity. This partial resistance was shown to be due to internal factors inhibiting the spread of the fungus within the berry, and not to an obstruction of the skin to penetration by the fungus. An apparatus for measuring the resistance of the skin to perforation is described and illustrated; it could not be proved conclusively, however, that a relationship exists between susceptibility of the berry and perforation

resistance of the skin. Nor was it possible to discover a relationship between juice composition and resistance to the spread of the fungus within the berry.—Wädenswil. [See also *H.A.*, 23: 2840.]

4018. CURZEL, V.

Lotta contro la peronospora della vite con anticrittogamici acuprici od a basso tenore di rame. (Control of vine downy mildew with non-copper and low-copper fungicides.)

Riv. Vitic. Enol., 1953, 6: 135-9.

In an experiment at the Stazione Enologica Sperimentale at Asti in 1952 seven non-copper and low-copper fungicides were compared with 1% bordeaux mixture for the control of vine downy mildew on Barbera vines. Seven treatments timed in accordance with the weather on Baldacci's system were applied between early May and late July. The following 3 products gave good results and had no ill effects on foliage, fruit or must: (1) 65% CuSO_4 plus 35% Ca phosphate at 1%, (2) 16% Cu plus 30% S at 1%, and (3) 16% Cu oxychloride at 1%. The Cu/S mixture also gave good control of oidium. Tests with stickers were conducted.

4019. NACARAŠVILI, A. S.

The toxicity of dinitrorodanbenzol. [Russian.] *Vinodelie i Vinogradarstvo*, 1953, No. 7, p. 50.

Dinitrorodanbenzol in 1% suspension, with or without the addition of copper, was as effective as bordeaux mixture for vine mildew control, but it damaged the leaves and tender shoots of certain varieties. The phytotoxicity was not reduced after rainfall. In no variety did the preparation affect the inflorescence or berries.

4020. LUTTRELL, E. S.

Melanconium leaf and stem fleck of grapes. *Phytopathology*, 1953, 43: 347-8, illus., being *Pap. J. Ser. Ga Exp. Stat.* 234.

Bitter rot, caused by *Melanconium fuligineum*, is the most important berry rot of muscadine grapes (*Vitis rotundifolia*). Inoculations with suspensions of conidia produced infection in the vegetative parts as well as in the berries of both muscadine and bunch (*V. bourquina*) grapes. The leaf and stem fleck, lesions of which are illustrated, are of little economic importance.

Nematodes.

4021. FRANKLIN, M. T., AND BROWN, E. B.
Eelworm control on black currants.

A.R. Rothamsted exp. Stat. 1952, 1953, p. 99.

Severe pruning and parathion spraying were tested, separately and combined, for the control of *Aphelenchoides ritzema-bozi* in black currant bushes. Either method gave an appreciable reduction of the infestation, but a combination of both was found to be more effective.

4022. STANILAND, L. N.

Hot-water treatment of strawberry runners. *Plant Path.*, 1953, 2: 44-8, bibl. 4, illus.

The hot-water treatment of strawberry runners for the control of the leaf and bud eelworms, *Aphelenchoides fragariae* and *A. ritzeni-bosi*, and the stem and bulb eelworm, *Ditylenchus dipsaci*, has never become a regular practice because the usual method of dipping for 20 minutes at 110° F. followed by a plunge in cold water often caused damage. A description is given of trials which demonstrated that effective control of *D. dipsaci* without damage to the runners can be obtained by dipping for 7 minutes at 115°. Dipping for 10 minutes may be necessary for complete control of *Aphelenchoides* spp. An improved bath is described and illustrated.—N.A.A.S., Bristol.

4023. LORDELLO, L. G. E.

Nota prévia sobre um nematódeo encontrado associado à uma moléstia das folhas do morangueiro. (Preliminary note on a nematode associated with a leaf disease in strawberry.) [English summary 10 lines.] *Rev. Agric. Piracicaba*, 1953, 28: 130-1, bibl. 1.

The nematode, *Procephalobus mycophilus*, here recorded for the first time in Brazil, was found in 1953 on strawberry leaves infected with the fungus *Mycosphaerella fragariae*. It may perhaps be a carrier of the fungal spores.—Esc. sup. Agric. "Luiz de Queiroz", Univ. S. Paulo.

4024. GRAHAM, T. W., AND HOLDEMAN, Q. L.

The sting nematode, *Belonolaimus gracilis*, on cotton and other crops in South Carolina. From abstr. in *Phytopathology*, 1953, 43: 291.

The sting nematode caused severe field damage on strawberries in S. Carolina in 1950-1952, the symptoms being retarded growth and decayed roots. Soil fumigation gave control in greenhouse and field experiments and restored normal growth. EDB and DD were effective at 4 and 20 gal./acre or more respectively.

Mites.

(See also 3907, 4055, 4081, 4095p, 4171, 4172.)

4025. BRIMBLECOMBE, A. R.

Red spider mites and their control. *Qd agric. J.*, 1953, 76: 63-8, illus.

Notes are given on *Tetranychus urticae*, common in most parts of E. Queensland, and *Tetranychus* (syn. *Eotetranychus*) *telarius*, known only in the south-east, which cause severe damage to vegetables, deciduous and small fruits, vines, tobacco and papaw. Recommendations are made for their control with sulphur, nicotine and phosphoric ester dusts or sprays.

4026. HUECK, H. J., AND OTHERS.

The increase of egg production of the fruit tree spider mite (*Metatetranychus ulmi* Koch) under influence of DDT. Reprinted from *Physiol. comp. oecol.*, 1952, 2: 371-7, bibl. 8.

Low concentrations of DDT were found to stimulate egg production in the fruit tree red spider (*Metatetranychus ulmi*), if the treatment coincided with the susceptible phase of the mite at about the egg-laying

period. These observations would account for increased outbreaks of the pest after application of DDT in the absence of predators.—Leiden Univ.

4027. KUENEN, D. J.

The fruit tree red spider (*Metatetranychus ulmi* Koch, Tetranychidae, Acari) and its relation to its host plant.

Reprinted from *Tijdschr. Ent.*, 1948 (1949), 91: 83-102, bibl. 12, illus. [received 1953].

Certain aspects of the influence of food on the epidemiology of the fruit tree red spider have been investigated as part of a general study on its biology and control. [From author's summary.]

4028. CANO, F.

Alcune osservazioni sulla lotta invernale contro il ragno rosso. (Some notes on dormant control of red spider.)

Not. Mal. Piante, 1953, No. 22, pp. 31-4.

Notes are given on large-scale experiments conducted in northern Italy in the winter of 1952 on the control of red spider, 5% emulsions of tar oils and mineral oils with added synthetic compounds being used. Good results were shown by 4,6-dinitro-o-sec-butylphenol at 0.75-2.0% and by 2,4-dinitro-6-cyclohexylphenol, but parachlorophenolbenzenesulphone and parachlorophenolparachlorobenzenesulphone at 2% in a tar oil emulsion gave virtually no control.

4029. HOFMASTER, R. N., AND GREENWOOD, D. E.

Control of mites on strawberries in Virginia. *J. econ. Ent.*, 1953, 46: 224-33, bibl. 3, being *Pap. J. Ser. Va Truck. Exp. Stat.* 117.

The two-spotted mite, *Tetranychus bimaculatus*, and strawberry spider mite, *T. atlanticus*, are the species of greatest economic importance. Detailed results of control trials conducted through both dormant and growing seasons show systox, at appropriate rates, to be very effective against both mites. Other successful materials tested against one or both species were parathion+sulphur, parathion+ovotran, aramite, TEPP, sulphenone and dinitro caprylphenyl crotonate. Residue analyses of treated berries are given. Dipping strawberry plants prior to transplanting in a solution containing 1 quart of systox per 100 gal. greatly decreased first season mite infestation.

4030. REED, J.

New insect pest invades Jersey strawberry fields.

N.J. Agric., 1953, 35 (3): 14.

A note on one successful and one unsuccessful lindane treatment for cyclamen mite, *Tarsonemus pallidus*, control.

4031. LAMB, K. P.

Survey of red spider mites (Acarina: Tetranychidae) on grape vines.

N.Z. J. Sci. Tech., Sect. A, 1953, 35: 65-6.

Mites have recently become of economic importance as pests of glasshouse vines in New Zealand. A survey has shown *Tetranychus urticae* to be widespread, whereas *Eotetranychus sexmaculatus* is restricted to the Auckland area.

Insects.

(See also 3781, 4084, 4095a, c, e, f, g, i, l, n, o, q, r, t, u, w, z, 4096a, b, 4173.)

4032. ROBERTI, D.

La formica argentina non desta più preoccupazioni. (The Argentine ant no longer gives cause for alarm.)

Ital. agric., 1953, 90: 407-12, illus.

Iridomyrmex humilis, its morphology, life history, depredations, and control by poison bait, trapping and chlorinated hydrocarbon sprays.

4033. N.S.W. DEPARTMENT OF AGRICULTURE, ENTOMOLOGICAL BRANCH.

The cherry aphid.

Agric. Gaz. N.S.W., 1953, 64: 263-5, illus.

Notes are given on *Myzus cerasi*, the injury it causes and its life history. A routine preventive dormant spray of tar distillate or DDT in pale oil is recommended and, if necessary, a nicotine sulphate or HETP spray during the growing season.

4034. SAVARY, A.

Le puceron cendré du poirier (*Sappaphis pyri* Fonsc.) en Suisse romande. (The pear bedstraw aphid in French-speaking Switzerland.) [English summary $\frac{1}{2}$ p.]

Landw. Jb. Schweiz, 1953, 67: 249-314, bibl. 45, illus.

Sappaphis pyri is a major pest of pear in western Switzerland, particularly in the upper Rhône Valley and near the lakes. Control by winter washes or pruning proved unsatisfactory, but watering with 0.1% octamethylpyrophosphoramidate after blossom gave excellent results. Parathion was also fairly successful, but a systemic insecticide is thought to be preferable because of its selective action. The degree of infestation was found to vary greatly from year to year, but counts of winter eggs made possible accurate forecasts of population levels the following spring. The biology of the pest is discussed in detail, and a key is presented by which several aphid species on pear can be identified from the symptoms they produce. Differences in varietal susceptibility appear to offer prospects of breeding pear varieties resistant to the bedstraw aphid. —Lausanne.

4035. SIEGLER, E. H.

Soil insecticides for control of woolly apple aphids on nursery stock.

J. econ. Ent., 1953, 46: 177-8, bibl. 2.

Experiments were conducted over 2 years in Virginia to test the value of soil treatments for control of the woolly apple aphid, *Eriosoma lanigerum*. In the first year, when the insecticides were distributed in furrows before planting, BHC killed all trees, but none of the other materials caused any injury. Chlordane gave the best control of the aphid, followed by toxaphene. The following year, when the trees were 1 year old and the materials were applied to the soil surface, BHC caused no injury and gave excellent aphid control. During both years DDT was the least effective of the insecticides used.

4036. NEWCOMER, E. J., AND DEAN, F. P.

Control of woolly apple aphids in orchards sprayed with DDT.

J. econ. Ent., 1953, 46: 54-6, bibl. 4.

In the Pacific Northwest the use of DDT on apple trees, to control codling moth, greatly increased the infestation of woolly apple aphid, *Eriosoma lanigerum*. Of the chemicals tested parathion, malathion, metacide, toxaphene and xanthone were found effective against the aphid.

4037. WARTENBERG, H.

Über pflanzenphysiologische Ursachen des Massenwechsels der Apfelblutlaus (*Eriosoma lanigerum* auf *Malus pumila*). (Causes of changes in population density of woolly aphid on crab apple.)

Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 53-6.

The population density of woolly aphid on apple has two maxima in every season, the first, not quite so pronounced as the second, at the time of shoot growth in spring, the second during the period of shoot growth in late summer and autumn. It has been supposed that the depression between the two peaks is due to the activity of *Aphelinus mali*. This is not so, however, for on non-fruited trees and on suckers which continue to grow the build-up of the aphid is continuous. In the author's view the parallelism between shoot growth and aphid multiplication is accounted for by seasonal changes in the hormone metabolism of the cambium. The probable mechanism of host response to aphid saliva and the relationship between the formation of gall parenchyma and aphid multiplication are discussed.—Inst. f. Phytopathologie, Naumburg a.d.S.

4038. RUZAEV, K. S.

The testing of a new preparation for phylloxera control. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 5, pp. 41-4.

In the trials described, preparation No. 47 [chemical composition not given] synthesized by the All-Union Institute for Plant Protection, applied to the soil at rates stated, gave very satisfactory control of phylloxera and increased the vigour of the treated vines. The indirect effects of this preparation on plants and its action on the soil microflora and nitrate accumulation in the soil was also studied. In no case did the treatment affect the flavour or aroma of grapes.

4039. COOPER, C. M.

Mealybug in grapevines.

J. agric. S. Aust., 1953, 56: 453-5, 459, illus.

In the River Murray Irrigated Areas insecticidal sprays have completely failed to control mealybugs (of which the commonest South Australian species is *Pseudococcus longispinus*) and in many cases have resulted in an increase in the population. The commonest insect predators of the mealybug in River districts are the ladybirds, *Leis conformis* and *Cryptolaemus* sp., and the green lacewing. A policy adopted in some sultana vineyards in Berri in 1950 of abandoning insecticidal sprays completely and leaving a plentiful plant cover for the predators has achieved considerable success. A state of equilibrium appears to have been reached between pest and predator, and fruit infestation has fallen from 50-85% to 2%.

4040. PIERI, G.

Novità nella lotta contro la cocciniglia cotonosa. (New method of mealybug control.)

Riv. Vitic. Enol., 1953, 6: 122-3.

Pestox 66 (66% octamethylpyrophosphoramidate) and a phosphoric ester were compared in a test in the control of mealybug [*Pseudococcus citri*] on vine at the Stazione Sperimentale di Viticoltura at Conegliano. Sprays of each were applied on 19 July, 1952, during a moderate attack and caused considerable mortality. A new attack occurred on 12/13 August on the vines treated with the phosphoric ester, but not until 22 August on the vines treated with pestox 66. Each lot was given a second treatment when the mealybugs reappeared. Further attacks on both lots occurred towards the end of September. Both products removed bloom.

4041. HORUNŽIČ, P. M.

Control of cockchafer larvae by means of deep application of BHC. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 6, pp. 51-3, bibl. 2, illus.

Methods of BHC treatment for the control of cockchafer larvae damaging newly planted vines in sandy soils are described. The best results were obtained by applying a 12% dust in the spring into 4 slits 50 cm. deep around the bush about 20 cm. distant from the stem at the rate of 7-8 g. per slit. Direct contact of BHC with the plant inhibited root development and reduced shoot growth. Of the 3,200 bushes used in these trials 10 were destroyed by the grubs, 9 of them being controls.

4042. NAUMENKO, I. M.

A trial for the control of cockchafer larvae. [Russian.]

Sad i Ogorod, 1953, No. 7, pp. 36-8.

BHC was found satisfactory for white grub control in 4 different soil types at rates given, and is recommended for application at appropriate dates which are discussed. The insecticide should not be applied simultaneously with organic fertilizers. Methods of treatment and machines used are discussed.

4043. SNAPP, O. I.

Aldrin and dieldrin as soil insecticides to control plum curculio.

J. econ. Ent., 1953, 46: 180, bibl. 4.

Results of laboratory experiments show that aldrin worked into the soil was highly effective against plum curculio, *Conotrachelus nenuphar*, during its immature stages and that dieldrin was fairly effective.

4044. STAUB, A.

Der Pflaumenbohrer, ein Gelegenheits-schädling. (*Rhynchites cupreus*, an occasional pest of plums.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 287-9, illus.

In July, 1953, *Rhynchites cupreus* occurred as a pest of young zwetschen fruits in the Zürich area. The biology of the beetle and the injury caused by it are briefly discussed and illustrated. One application of DDT against the adult insect should suffice.

4045. GÖRZ, B.

Zur Wirkung synthetischer Insektengifte gegen die Larven des Rebstichlers *Byctiscus betulae* L. (The effect of synthetic insecticides on the larvae of *Byctiscus betulae* on vine.)

Z. PflKrankh., 1953, 60: 397-406, bibl. 12, illus.

Leaf rolling is the most serious effect of this beetle. DDT has given good lasting effects, but lindane preparations and phosphoric acid esters are also proving useful. Phenomena following the use of nexen, nexit, gesapon, straunex and other lindane products are here discussed.

4046. HÄFLIGER, E.

Neue Beiträge zur Bekämpfung der Kirschenfliege (*Rhagoletis cerasi* L.). (New contributions to the control of the cherry fruit fly.) [English summary $\frac{1}{2}$ p.]

Z. PflKrankh., 1953, 60: 246-60, bibl. 10.

In large-scale trials on cherry fruit fly control combined DDT-parathion preparations were compared with DDT wettable powder applied alone. The combined treatment acted on all stages of the pest from egg to adult fly and had a residual effect of 4 weeks. Hence, only one treatment was needed, as against two in the case of DDT, but a thorough application was necessary for the spray to wet every fruit. Spraying with the combined insecticides should be carried out about 3 weeks before harvest or when there are more than 20-40 punctures per 100 cherries. The concentration used in the experiments was 100 g. DDT and 20 g. parathion per 100 l., but it was found later that 20 g. of parathion was unnecessarily high. The larvicidal action of parathion and another phosphorus compound, diazinon, was studied more closely in single-tree and laboratory experiments, in which the lethal dosage was determined as 2 g./100 l.—Wädenswil.

4047. FRICK, K. E., AND SIMKOVER, H. G.

Insecticides for killing cherry fruit fly maggots within the fruit.

J. econ. Ent., 1953, 46: 361-2, bibl. 2, being *Sci. Pap. Wash. St. agric. Exp. Stat.* 1177.

Parathion at 1 pt of 32.1% emulsion and systox at 1 lb. of 25% w.p., both in 100 gal., caused high mortality of cherry fruit fly, *Rhagoletis cingulata*, maggots within the cherries. It is thought that the insecticides penetrated through the skin and then acted as fumigants, killing the maggots by toxic vapours in the tunnels in the flesh. The black cherry fruit fly, *R. fausta*, may be controlled in the maggot stage by the same method.

4048. SCHUHMANN, G.

Untersuchungen über die Wirkung von Phosphorsäureestern auf Schädlinge im Obstbau (*Rhagoletis cerasi* L., *Laspeyresia funebrana* Tr., *Hoplocampa minuta* Christ., *Hoplocampa flava* L. und *Quadraspidiotus perniciosus* Comst.). (Investigations on the action of phosphoric acid esters on fruit tree pests.)

Diss. landw. Hochschule Hohenheim, 1952, from abstr. in *Z. PflKrankh.*, 1953, 60: 369.

The following are among the results obtained: (1) E605 forte (0.05%) penetrated to the stone of half-ripe and ripe cherries within 24 hours. The ester content in the fruits decreased after a few days and after 17 days only traces were detectable. The spray had no ovicidal action, but *Rhagoletis cerasi* larvae were killed on emergence. The effect of systox (0.1%) and pestox (0.3%) persisted 20 days longer than that of E605 forte. A combined treatment of DDT and phosphoric esters 3 weeks before harvesting is recommended for cherry fruit fly control. (2) An application of E605 forte

(0.03%) gave satisfactory control of *Laspeyresia funebrana* in zwetschens when made after the invasion of the fruits by the first larvae of the second generation. The ester was not translocated in the fruit flesh, but its vapour penetrated through the larval galleries. (3) All the *Hoplocampa minuta* and *H. flava* larvae in their younger stages and most of the larvae in their later stages were killed in the fruits by E605 (0.03%), again presumably by the vapour in the galleries. (4) The penetration of E605 forte into the bark was studied. At a concentration of 0.03% the chemical was detectable in the outer cork layer of apple bark for up to 32 days and at 0.05% for up to 50 days, but only traces of the active agent were found in the underlying bast and parenchyma layers and none in the secondary wood. In the outer cork layer of currant bark the insecticide hardly decreased for 90 days. Data are given on the earliest settlement of young *Aspidiotus perniciosus* aphids on bark and apple fruits after treatment. Best results with E605 forte (0.05%) in the open are expected from applications towards the end of June, and a treatment in September against the autumn generation is also considered promising. In the latter case the reduced activity of the ester at lower temperatures would be compensated by the greater susceptibility of the young aphids. The investigation was carried out largely at the Inst. f. Obstbau, Biol. Bundesanst., Heidelberg.

4049. DELMAS, H.-G.

Essai de lutte chimique contre *Ceratitis capitata* Wied. (Experiment on the chemical control of *Ceratitis capitata*).
C.R. Acad. Agric. Fr., 1953, 39: 394-7.

Oil emulsions of dieldrin and DDT both gave good control of *Ceratitis* on peach in the 2 tests described but dieldrin caused fruit injury. The use of DDT oil emulsion at 125 g./hl. is tentatively recommended, applications being made 20 and 10 days before harvesting.

4050. BAGGIOLINI, M.

La lutte contre la cératite par piégeage à l'aide de gobe-mouches. (Mediterranean fruit fly control by traps.)
Rev. romande Agric. Vitic., 1953, 9: 43-4, bibl. 3, illus.

Ceratitis capitata has become an important pest in Switzerland where all fruits, but more especially peaches, are attacked. Spraying is not considered economical on small holdings, but traps are recommended. They are described and illustrated.

4051. VERGANI, A. R.

La "mosca del Mediterraneo", *Ceratitis capitata* (Wied.). (The Mediterranean fruit fly, *Ceratitis capitata*.)
Bol. Estac. exp. Cinco Saltos, 1952, 4 (special number), pp. 12, illus.

Notes are given on the distribution, climatic preferences and biology of the Mediterranean fruit fly in Argentina. Control by poison bait (fluorides, fluosilicates and arsenites) is recommended.

4052. MORRISON, L. G.

Apple leaf-curling midge, a new pest in New Zealand.
Plant Prot. Bull., 1953, 1: 115-16, illus.

First recorded in New Zealand in 1950, *Dasyneura mali* is now an established pest. Larval feeding causes inward rolling of leaf edges on terminal branches and watersprouts but not, as yet, stunting of the trees. 3-4 applications per season of 2% sprays of 50% DDT wettable powder give satisfactory control in New England, U.S.A., but 3-weekly application of this spray has not yet halted the spread of the midge in New Zealand.

4053. HOUTMAN, G.

De galmug van het zwartebeessenblad (*Dasyneura tetensi* Rübsaamen). (The black currant gall midge, *Dasyneura tetensi*.)
Fruiteelt, 1953, 43: 520-1, bibl. 1, illus.

Observations are made on the occurrence, biology and control of the black currant gall midge in Holland in recent years. Parathion is effective against the grubs but can only be used against the first and second generations because of the danger of toxic residues on the fruit. Cuttings should not be raised near infested plantations. Pruning should not be too severe as the pest develops best on young shoots.

4054. COMITÉ NATIONAL POUR L'ÉTUDE DE LA CULTURE FRUITIÈRE, BELGIQUE.

Carpocapse des pommes et des poires (*Cydia pomonella*). (Codling moth on apple and pear trees.)
Rap. gén. Com. nat. Ét. Cult. fruit., 2me Section, 1950-1952, pp. 16-22.

The results of insecticidal tests at Gorse Research Centre in 1950-1952 are summarized. Thiophosphates were found to have a fourfold effect: (1) they were highly efficient ovicides when applied at any time between egg laying and hatching; in laboratory tests eggs were the more easily destroyed the older they were and the higher the temperature, and R.H. also played an as yet undetermined role; (2) they had their full effect on larvae hatching up to 13 days after treatment; (3) they destroyed larvae under the skin and in the pulp of the fruit and in this respect had a residual effect of 20 days; (4) they killed adults after an interval, and egg laying between spraying and death was negligible. Atomization was not so successful as ordinary spraying. In a trial on residual effects DDT was better than lead arsenate.

4055. GLUŠENKOV, N. A.

Simultaneous control of codling moth and mites in the orchard. [Russian.]
Sad i Ogorod, 1953, No. 7, pp. 34-6.

In Central Asia the application 2, 3 or 4 times during the season of DDT+1% colloidal sulphur is recommended for the control of codling moth and spider mite infesting apples.

4056. HOUGH, W. S.

Influence of parathion wettable powder on effectiveness of DDT.
J. econ. Ent., 1953, 46: 368-9, bibl. 5.

Codling moth control tests demonstrated that initial and residual toxicity of 50% DDT wettable powder was increased by adding a small quantity of wettable parathion powder to the spray mixture. Improvement in residual toxicity to the larvae was noted 3 and 4 weeks after the fruit was sprayed. Improvement of

toxicity of 75% DDT was not noted in 1952 two weeks after the spray application. [From author's summary.]

4057. ORTEGA, J. C.

Walnuts in Southern California. Control of codling moth by treatment with new materials evaluated during 1952 season.

Calif. Agric., 1953, 7 (6): 6.

Isodrin, endrin, dilan, and diethyl diphenyl dichloroethane were compared with the standard DDT treatment in 1952. The first three were not so effective. The fourth, which had been less efficacious in 1951, was this time the best.

4058. TASCHENBERG, E. F.

Control of grape berry moth with synthetic organic insecticides.

J. econ. Ent., 1953, 46: 77-84, bibl. 8, being J. Pap. N.Y. St. agric. Exp. Stat. 901.

Of the 6 chlorinated hydrocarbons tested against grape berry moth, *Polychrosis viteana*, in New York, DDT and methoxychlor were found effective and the test material Q137 [an analogue of DDT] showed promise; of the 6 organic phosphorus insecticides, parathion and EPN gave good control. The results were satisfactory when the chemicals were applied twice during the season, though a third treatment improved control. In a schedule of 3 sprays metacide and the diethoxy thiophosphoric ester of 4-methyl 7-hydroxy coumarin also gave good results.

4059. TASCHENBERG, E. F.

Evaluation of petroleum and vegetable oils on grape berry moth eggs.

J. econ. Ent., 1953, 46: 85-91, bibl. 11, being J. Pap. N.Y. St. agric. Exp. Stat. 902.

In laboratory studies in New York the more efficient petroleum oils against grape berry moth, *Polychrosis viteana*, eggs were those with a composition high in paraffinic structures. Of the vegetable oils tested cotton seed oil was slightly superior to peanut and linseed oils. The ovicidal efficiency of both petroleum and vegetable oils was reduced when bordeaux mixture and lead arsenate were added to the sprays.

4060. VAN GEIT, P.

La phalène du groseillier (*Abraxas grossulariata* L.). (The magpie moth.)

Bull. hort., Liège, 1953, 8: 176-80, illus.

Notes are given on the morphology and biology of the magpie moth, *Abraxas grossulariata*, and on its control at various times of the year. Censuses taken in March and April in 1951 and 1952 showed that the young caterpillars do not all emerge from hibernation at the same time. In an experiment in spring control 5 spray treatments were applied on 10 April, 1952, when some caterpillars had just emerged from hibernation and others were a little older: 95% nicotine at 1 $\frac{1}{2}$ %, E605 at 0.25%, 50% DDT at 2 $\frac{1}{2}$ %, 50% BHC at 2 $\frac{1}{2}$ % and lead arsenate at 5 $\frac{1}{2}$ %. After 3 days the bushes treated with DDT and BHC were entirely free from magpie moth caterpillars. After 4 days the mortality was: nicotine 54%, E605 91%, DDT 100%, BHC 100% and lead arsenate 94%. After 6 days the bushes treated with E605 and lead arsenate were entirely free. Dusting with DDT and BHC gave the same results as spraying and

these are the insecticides recommended.—École prof. de Spéc. hort., Anderlecht.

4061. BENDER, E.

Auftreten, Schaden und Bekämpfung einiger Tortriciden an Obstbäumen in den Jahren 1949-1952. (Incidence and control of some fruit tortricids and the damage caused by them in the years 1949-52.)

Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 218-24.

These observations and experiments, made on Lake Constance, relate chiefly to *Capua reticulana*, but 3 *Cacoecia* spp. and 3 *Pandemis* spp. were also encountered. Trials confirmed earlier findings that winter washes are ineffective and that DDT, BHC and parathion added to routine sprays considerably reduce larval and moth populations. Data are tabulated for counts made after applications at several dates. The best time for treatment still remains to be determined. [See also H.A., 23: 2905.]

4062. HINRICHS, H. A., AND BIEBERDORF, G. A.

The pecan nut casebearer and its control.

Bull. Okla. agric. Exp. Stat. B-392, 1953, pp. 10, bibl. 1, illus.

One spray application, usually during the first weeks in June, of 4 lb. of 50% DDT w.p. in 100 gal. was found most effective for the control of pecan nut casebearer, *Acrobasis caryae*. Zerlate or bordeaux may be added to the spray for the combined control of casebearer and pecan scab. Parathion may be substituted for DDT to avoid increase of aphid and mite infestation, but 2 treatments will then be needed.

4063. N.S.W. DEPARTMENT OF AGRICULTURE, ENTOMOLOGICAL BRANCH.

The mottled cup moth.

Agric. Gaz. N.S.W., 1953, 64: 265, illus.

Doratifera vulnerans caterpillars appear to feed chiefly on the foliage of *Eucalyptus* spp. but in some seasons they become numerous on apricot or guava trees and cause considerable damage. Control is by spraying with DDT or lead arsenate.

4064. EHRENHARDT, H., AND OTHERS.

Beiträge zur Biologie und Bekämpfung von *Hyphantria cunea* auf Grund von Beobachtungen und experimentellen Untersuchungen am Internationalen Laboratorium zum Studium von *Hyphantria cunea* in Palić (Jugoslawien). (Contributions to the biology and control of *Hyphantria cunea* based on observations and experiments made at the International Laboratory for the study of *Hyphantria cunea* in Palić (Yugoslavia).) [English and Yugoslav summaries 3 $\frac{1}{2}$ pp. each.]

Zashit. Bilja, Belgrade, 1953, No. 16/17, pp. 19-57, bibl. 13, illus.

From results of laboratory trials, confirmed by field experiments, it is concluded that for satisfactory control of *Hyphantria cunea* spray or dust applications of DDT, DDT+BHC, BHC, parathion or the stomach poison Holfidal should be made, preferably up to the third larval stage. Control of later stages

is more difficult and necessitates the use of larger quantities of insecticides. In case of slight infestation, mechanical control is recommended.

4065. TODOROVIĆ, S.

Borba protiv dudovca u NR Srbiji 1952 godine. (The control of fall webworm in Serbia in 1952.) [English summary 4 pp.] *Zasht. Bilja*, Belgrade, 1953, No. 16/17, pp. 81-107, illus.

The organization and conduct of a large-scale control campaign by mechanical and chemical means is described. The various insecticides used were based on either DDT or BHC. Fruit trees were among the most important tree species treated.

4066. MASTEN, V.

Pojava dudovca u NR Sloveniji 1952 godine. (The appearance of fall webworm in Slovenia and its control in 1952.) [English summary 1½ p.] *Zasht. Bilja*, Belgrade, 1953, No. 16/17, pp. 115-21.

Chemical treatment was not necessary as the removal and burning of caterpillar nests provided satisfactory control. In laboratory trials 0.05% "Fosferno 20" (a parathion compound) and in field experiments a 1.5% DDT spray were found effective.

4067. MILOSAVLJEVIĆ, R.

Some observations on aeroplane application for the control of fall webworm caterpillars in Vojvodina in 1952. [Serbian, with English summary ½ p.]

HADŽISTEVIĆ, D.

Neka zapazanja o suzbijanju dudovca aviometodom u 1952 godini. (Some observations on aeroplane treatment of fall webworm in 1952.) [French summary ½ p.]

JORDOVIĆ, M.

Aeroplane treatment of fall webworm caterpillars in northern Bačka in 1952. [Serbian, with French summary ½ p.]

Zasht. Bilja, Belgrade, 1953, No. 16/17, pp. 124-8, 129-33, and 134-7, respectively.

In a series of tests with 16.5% DDT in oil applied in aerosol form from aeroplanes the sprays did not penetrate the nests of *Hyphantria cunea* adequately, but gave good control when the caterpillars were emerging from the nests.

4068. SOENEN, A., AND AERTS, R.

Contribution à l'étude des mineuses des arbres fruitiers. (A contribution to the study of fruit tree leaf miners.)

Fruit belge, 1953, 21: 1-5, 28-31, 45-8, 58-61, 107-12, illus.

Morphological and biological notes are given on *Lyonetia clerkella*, *Cemiotoma scitella*, *Ornix guttea*, *Lithocolletis corylifoliella* and *L. blancardella*, and their insect and fungal parasites are briefly mentioned. In control experiments against the caterpillars at Gorse Research Station (IRSIA) a phosphoric ester was very efficacious against all except *Ornix guttea*, and a systemic insecticide gave good results against *Cemio-*

stoma and *Lyonetia* but variable results with the other species.

4069. COMITÉ NATIONAL POUR L'ÉTUDE DE LA CULTURE FRUITIÈRE, BELGIQUE.

Autres parasites. I. *Hoplocampes*. (Other parasites. I. *Hoplocampa* [testudinea].)

Rap. gén. Com. nat. Ét. Cult. fruit., 2me Section, 1950-1952, pp. 24-7.

Insecticidal experiments at Gorse Research Centre led to the following conclusions: (1) larvicidal treatments must be timed by direct observations of hatching since the incubation period varies from year to year; (2) certain BHC products with high sticker and wetter contents resisted leaching by heavy rain well; (3) thiophosphates killed larvae in the fruit; (4) the fact that fruits continue to show a characteristic depression at the point of oviposition up to the time of harvesting provides a means of determining the efficacy of treatment.

4070. KIRBY, A. H. M., AND GAMBRILL, R. G.

The use of some newer insecticides for the control of apple sawfly, *Hoplocampa testudinea* (Klug.).

J. hort. Sci., 1953, 28: 163-9, bibl. 18.

Field trials have been conducted, on large trees in 1949 and on small trees in 1950, to compare the efficiency of new synthetic chemicals with that of nicotine for control of apple sawfly. A high degree of control was obtained with parathion at 0.01% to 0.02% in both years, and with six chlorinated hydrocarbon insecticides in 1950. All applications, save one, were made at petal-fall and the one egg-hatch spray applied in 1949 gave little improvement over a similar spray applied at petal-fall. All materials tested seem to be admissible on grounds of compatibility with lime-sulphur and lack of phytotoxicity. γ -benzene hexachloride was very effective at 0.01% and gave commercial control at 0.005%. This insecticide, however, is very poisonous to honeybees and probably to other pollinating insects, and applications should be left until petal-fall is complete, except perhaps on Worcester Pearmain, where calyx-closure may intervene. The use of BHC in mixed orchards presents difficult problems. Toxaphene gave commercial control at 0.1%. This insecticide is much less toxic to bees than is γ -benzene hexachloride or parathion, and could probably be applied at 80% petal-fall with very little risk to them. [Authors' summary.]—East Malling Research Station.

4071. KIRBY, A. H. M., AND MCKINLAY, K. S.

Some factors affecting the control of apple sawfly, *Hoplocampa testudinea* (Klug), by nicotine and other chemicals.

J. hort. Sci., 1953, 28: 170-6, bibl. 13.

The influence of weather conditions upon the degree of control of apple sawfly obtained with nicotine in trials has been studied for the years 1946-48 and 1950. It is concluded that the temperature on the day of spraying is not a factor in control by nicotine, but a study of the maximum temperatures during the period following spraying and up to egg-hatch in each year suggests that a cool period subsequent to spraying may delay egg-hatch beyond the period for which sufficient nicotine may persist. The effects of the interaction of

blossoming period, pollination period and sawfly egg-laying period are discussed, and data provided for the latter and also egg-development in 1950. Nicotine, at least in the presence of most wetters, does not act as an ovicide upon apple sawfly eggs, and the same conclusion seems valid for the potential substitutes. Evidence points to a stomach-poison action of nicotine, but the other materials tested seem to act upon the larva mainly or entirely by contact action. [From authors' summary.]—East Malling Research Station.

4072. KRÖBER, H.

Spitzen- und Blütendürre an Birnen. (The withering of shoot tips and flowers on pears.) *NachBl. dtsh. PflSchDienst., Braunschweig*, 1953, 5: 84-5, bibl. 3, illus.

Symptoms of die-back, described as reminiscent of wither-tip and blossom blight of sour cherry, were encountered in a pear orchard near Cologne. The cause of the trouble was an attack by *Psylla pirisuga*.

4073. BREKKE, J. E., AND OTHERS.

Studies on removal of thrips from cane berries intended for processing. (Publ.) U.S. Dep. Agric. AIC-353, 1953, pp. 5.

In the experiment described water washing removed somewhat less than half of the thrips infesting raspberries, whereas wetting the berries first in a 0.1% solution of a sodium alkyl aryl sulphonate and then washing in water removed 85-95%. No effect on texture, flavour or colour could be detected in processed products prepared from detergent-treated red and black raspberries.

Other pests.

(See also 4095s, 4176.)

4074. KIRCHNER, —.

Beobachtungen über Nagerschäden in einer Obstanlage. (Observations on rodent injuries in a fruit plantation.) *NachrBl. dtsh. PflSchDienst, Berlin*, 1953, 7: 135-6.

In an orchard and a nursery, that could not be entirely fenced in, it was found that (1) voles have a preference for roots of EM. IX, and also like those of EM. IV, VII, V and II; (2) hares also prefer trees on those rootstocks, which suggests that the rootstock has a certain influence on the composition of the stem just above the union; (3) hares have preferences for certain apple varieties, which are named; (4) hares prefer young apple to young pear trees, with the exception of the variety Clapps Favourite. Plum and cherry trees over 2 years old were not injured by hares.

4075. HERRICK, E. H.

Control of mammals injurious to agriculture in Kansas. *Circ. Kans. agric. Exp. Stat.* 296, 1953, pp. 18.

Accepted methods of dealing with the following pests are discussed: pocket gophers, prairie dogs, ground squirrels, woodchucks, mice, rats, moles, rabbits and coyotes.

4076. SERVICE DE LA DÉFENSE DES VÉGÉTAUX, MAROC.

Destruction des moineaux des champs (Moineau espagnol et moineau hybride). Observations sur quelques méthodes de destruction expérimentées au Maroc. (Destruction of field sparrows. [Spanish and hybrid sparrows.] Notes on some methods of destruction tested in Morocco.)

Terre maroc., 1953, 27: 89-92.

Despite control legislation enacted in 1933 sparrows have greatly increased in numbers in Morocco. The Plant Protection Service studied the problem of their control between 1949 and 1952. Methods tested were nest destruction, poison baiting, flame-throwers, bombs, poison gas and netting. Only nest destruction and netting are recommended. If nest destruction alone were actively conducted annually numbers would be greatly reduced in a few years.

Fungicides.

(See also 4095b, k, m, 4315, 4753.)

4077. HUBBELL, D. S.

A new copper fungicide. *Agric. Chemts*, 1953, 8: 54-6, 159-60.

The physical and chemical properties of Robertson fungicide are discussed. It has a core of metallic copper with a covering of cuprous oxide, and it is said to be a good source of cuprous copper. In tests on bean plants the new fungicide proved no more toxic than other widely used Cu compounds or than the particular organic compounds with which it was compared.

4078. GAUSMAN, H. W., AND OTHERS.

Fungicidal properties of some carbonic and thiocarbonic acid derivatives of hydrazine. *Bot. Gaz.*, 1953, 114: 293-6, bibl. 3, illus.

Under the conditions and test methods used in this investigation the following chemicals showed promise as effective fungicides by inhibiting the growth of *Helminthosporium sativum*, *Rhizoctonia* sp., and *Pythium* sp.: 1-phenylthiocarbohydrazide; thiocarbohydrazide; thiosemicarbazide; hydrazine sulphate; and methyl hydrazine sulphate. [From authors' summary.]—Deps Agron. and Chem., Univ. Illinois.

4079. DU PONT DE NEMOURS & COMPANY (INC.), E. J.

New uses for "Manzate" fungicide. *Agric. Newsl.*, 1953, 21: 54.

The manganese-containing dithiocarbamate fungicide Manzate, in addition to its use on tomato and potato, is now recommended for the control, in specified areas, of shot-hole in almond and peach, leaf curl in peach, black rot of grapes, early and late blight of celery, leaf spot diseases of carrot, and downy mildew, purple blotch and blast of onion. These recommendations result from extensive tests by Federal and State experiment stations in the U.S.A., and by Du Pont investigation stations in that country.

4080. MARTIN, J. T.

Distribution of copper fungicide deposits on plant surfaces. *Nature*, 1953, 172: 313-14, bibl. 1, illus.

A simple method has been devised by which the pattern of copper and lime-sulphur fungicide deposits on treated plant surfaces may be assessed and permanently recorded. A plaster of Paris technique has been used successfully to record the levels and distribution of copper deposits on bean, potato, tomato and banana leaves and of lime-sulphur deposits on apple leaves and fruitlets. The method is thought to be particularly useful in studying copper application problems in tropical areas where rainfall is an important consideration. Typical plaques are illustrated.—Long Ashton Res. Stat.

Insecticides.

(See also 4095h, m, 4096d, 4178, 4701, 4753.)

4081. FJELDDALEN, J.

Systemiske midler mot skadedyr på fruktraer, baervekster og prydplanter. (Systemic insecticides for the control of pests of top and small fruit and ornamentals.) [English summary 3 pp.]
Meld. Stat. Plantevern 8, 1953, pp. 40, bibl. 22.

Top fruit. Two applications of the schradan products Pestox 3 and Systam, or of Systox before and after blossom gave excellent control of fruit tree red spider mite (*Paratetranychus pilosus*) on apples and plums for at least three weeks after the last application, and were superior to applications immediately after blossom and three weeks later. One application was found to check the mite for two weeks before reinfestation occurred. Pre-blossom spraying gave two weeks' complete control of the green apple aphid, *Aphis pomi*. Satisfactory control was also obtained of rosy apple aphid (*Yezabura malifolii*), mealy plum aphid (*Hyalopterus arundinis*) and black cherry aphid (*Myzus cerasi*). Systox also gave fairly good control of the larvae of apple leaf miner (*Lyonetia clerkella*) and the plum sawfly (*Hoplocampa minuta*). In orchards where predacious insects such as adults and larvae of coccinellids, larvae of *Syrphus* and *Chrysopa* occurred, no reduction of the populations could be detected.

Small fruit. The results of one application of Pestox 3 and Systox indicate that these materials have long and persistent effects against red spider mites (*Tetranychus* sp.) on strawberries. The number of mites increased much more quickly in the plots treated with parathion. The total crop was highest in the Systox plots. Two applications of Systox did not control the raspberry gall mite (*Eriophyes gracilis*). **Ornamentals.** A single drenching of carnation beds with Systox solution—5 litres per m²—gave four weeks' complete control of red spider. Two applications were necessary with Pestox 3. Both products when used as dips proved to have excellent effects against red spider mites attacking *Ficus carica*. Spray treatment of roses with Pestox 3 and Systox efficiently checked red spider mites resistant to parathion. Soil application did not control the mites satisfactorily. [From author's summary.] The tests were carried out on a large scale from 1950 to 1952 by the Norwegian Plant Protection Institute. Results with several minor glasshouse pests are also reported. The data indicate that Systox was more effective in the winter than were the schradan products. With a single exception, no plant injury occurred in any of the

flowers or woody ornamentals treated with systemic insecticides.

4082. RIPPER, W. E.

Systemic insecticides.

Pap. 3rd int. Congr. Crop Prot. 1952, Paris, pp. 56, bibl. 227.

The subjects covered in this review include: materials in practical use, fate of the systemic insecticide in the plant, its effect on the soil microflora, residue tolerances and precautions recommended in the use of systemic insecticides.

4083. COREY, R. A., AND OTHERS.

Diethyl 2-chlorovinyl phosphate and dimethyl 1-carbomethoxy-1-propen-2-yl phosphate—two new systemic phosphorus pesticides.

Science, 1953, 118: 28-9, bibl. 3.

Tests at the Shell Agricultural Laboratory, Modesto, California, showed that 2 new organic phosphorus compounds, diethyl 2-chlorovinyl phosphate and dimethyl 1-carbomethoxy-1-propen-2-yl phosphate, possess outstanding characteristics as systemic poisons and fumigants. They have extremely high systemic activity, moderate to high contact activity and mammalian toxicities approximately equal to those of systox and OMPA. As space fumigants they have high activity, and as grain fumigants they have a greater activity than chloropicrin or methyl bromide.

4084. WIESMANN, R., GASSER, R., AND GROB, H.

Über ein neuartiges, selektives Aphizid mit Tiefenwirkung. (On a new, selective aphicide with a penetrating action.)

Experientia, 1951, 7: 117-20, from abstr. in Z. PflKrankh., 1953, 60: 330.

A new systemic insecticide, 5,5-dimethyldihydroresorcinoldimethylcarbamate [dimetan], is described which has good insecticidal properties, both as a contact and stomach poison, though hardly more toxic to warm-blooded animals than DDT. High concentrations act on many insect species, but low concentrations of 0.02–0.04% affect aphids exclusively. Thus a 100% kill of *Doralis pomi*, *D. fabae*, and *Schizoneura lanigera* (woolly aphid) and a 30–70% kill of *Myzodes persicae* and *Brevicoryne brassicae* have been achieved without damage to the useful fauna. In some cases the preparation was as toxic as parathion and in others less so, but its systemic action was 3–8 times more rapid, an important factor in the control of virus vectors.

4085. GASSER, R.

Über das Verhalten von selektiven Insektiziden mit Tiefenwirkung in der Pflanze. (On the behaviour in the plant of selective insecticides with a penetrating action.)

Ber. Schweiz. bot. Ges., 1952, 62: 66-79, from abstr. in Z. PflKrankh., 1953, 60: 330.

Experiments with the aphicides 5,5-dimethylhydroresorcinoldimethylcarbamate (dimetan) and 1-phenyl-3-methyl-pyrazolyl-(5)-dimethylcarbamate (pyrolan), applied at 0.02–0.04%, showed that these compounds are absorbed readily by roots, leaves and the cut surface of shoots, and less readily by fruits. The chemicals, which are not stored by the plant, had no influence on physiological processes, apart from temporarily inhibiting CO₂ assimilation.

4086. NASIR, M. M.

Stability of contact insecticides. IV. Relationship between the ultra-violet absorption spectrum and the photolysis of DDT and the pyrethrins.

J. Sci. Food Agric., 1953, 4: 374-8, bibl. 18.

Evidence is presented to confirm the hypothesis that the rapid breakdown of the insecticides is associated with a comparatively narrow wave-band, strongly absorbed by them. Arising from this work, further information is available about the part played by solar radiation in inactivating insecticidal deposits. The protection of both insecticides against photolysis depends on the addition of substances that absorb the critical wave-band with sufficient intensity in thin films. Benzeneazobeta-naphthol and perhaps ferric chloride act in this way. J.S.

4087. ZWEEDE, A. K.

Smaakafwijkingen ten gevolge van het gebruik van insecticiden. (Off flavours resulting from application of insecticides.) [English summary $\frac{1}{2}$ p.] *Meded. Dir. Tuinb.*, 1953, 16: 349-56, bibl. 19.

Dutch work and foreign literature is reviewed on off flavours in fresh, canned and quick-frozen produce resulting from the use of BHC.

4088. JACKS, H.

A review of experimental work on lead-arsenate injury.

Orchard. N.Z., 1953, 26: 7-9, bibl. 9, illus.

The results of experiments carried out during the last 25 years may be summarized as follows: (1) lead arsenate in general is likely to cause foliage injury when applied without the addition of hydrated lime; hydrated lime should be added at double the amount of lead arsenate; (2) where lead arsenate and hydrated lime are used in combination with lime-sulphur, the addition of colloidal sulphur will reduce the risk of foliage injury; (3) water-soluble arsenic appears to be the primary cause of injury and its effect may be accentuated by high humidity and high temperature; (4) in preparing combinations of lead arsenate and sulphur sprays the lime-sulphur should be placed in the spray tank first, then the lead arsenate and hydrated lime mixed, and then the colloidal sulphur.

4089. MINISTRY OF AGRICULTURE, LONDON.

Precautions in the use of weed-killers and insecticides containing dinitro and organophosphorus compounds.

[*Publ. Minist. Agric. Lond. Form A(PS) 1*, 1953, pp. 11.

Regulations applying to employers and employees engaged in operations involving the use of dinitro and organophosphorus compounds are set out. The personnel of the inspectorate concerned is listed.

Spray apparatus and technique.

(See also 3953.)

4090. SMITH, L. C.

Okanagan "Turbo-mist" sprayer. Progress reports of 1952 trials.

J. Agric. S. Aust., 1953, 56: 415-17, 422, illus.

This Canadian sprayer was specially designed for spraying pome fruit trees, and uses air-blast to project concentrated spray. An 18 h.p. engine drives the blower and the agitator for the 130 gal. tank. The outfit is mounted on 4 wheels, has a loaded weight of 27 cwt. and can be drawn by any tractor. Trials showed that as wind speed increases the leaf coverage from air-blast becomes superior to that of hand spraying. Trials in progress indicate that apple scab and codling moth control with the Okanagan sprayer is at least comparable to that achieved by hand spraying.

4091. RASBASH, D. J.

The production of water spray of uniform drop size by a battery of hypodermic needles.

J. sci. Instrum., 1953, 30: 189-92, bibl. 3, illus.

The assembly of a spray apparatus consisting of 169 hypodermic needles is described. This apparatus could give a concentrated flow of spray at a wide range of drop sizes and rates of flow. In the range of drop size 0.6-2.4 mm., the drop size uniformity of the spray was much better than could be obtained by pressure nozzles. Coalescence of the drops while falling, however, was a factor which decreased the uniformity as compared with drops falling from a single needle. [Author's summary.] [Although concerned primarily with the extinction of fires by water sprays, the apparatus described may be of interest in relation to plant protection spraying techniques.]

4092. ZOBRIST, L., CLAUSEN, R., AND MÜHLETHALER, P.

Rebspritzung mit Helikopter. I. Der erste Versuch in der Schweiz. II. Vom Versuch zur praktischen Anwendung. (Spraying vines by helicopter. I. The first trial in Switzerland. II. From the experimental to the applied stage.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 246-9, 283-7, illus.

It took 4-5 minutes to spray 1 hectare of vines by helicopter against downy mildew, and the cost hardly exceeded that for the customary treatment by knapsack sprayer. Good coverage was achieved by two runs, along and across the rows, if the helicopter flew in curves at a height of 1.5-2.0 m. A 6-8% Cuprosan solution, applied as a mist at the rate of 140 l./hectare, did not cause any injury to the vines. The trials were carried out in large commercial vineyards in the Geneva district.

4093. GREEN, H. B.

Peach spraying—airplane vs. ground application.

J. econ. Ent., 1953, 46: 168-9, being *J. Art. Miss. agric. Exp. Stat.* 292.

In 1952 in Mississippi toxaphene was applied by ground equipment and aeroplane for plum curculio control on 3 varieties of peach. Better results were obtained with the ground equipment, though the aeroplane application showed a heavier insecticidal deposit.

4094. COURSHEE, R. J.

Spray nozzles.

World Crops, 1953, 5: 321-4, illus.

The principles involved in nozzle design are discussed

and the following typical forms are described: centrifugal or swirl, anvil, impinging jet, fan, airblast, spinning disc. Methods of controlling drop size are discussed; two unsolved practical problems are the cheap and efficient production of very small drops, and drops of roughly equal size of solutions and of solids in liquid suspensions.

Noted.

4095.

- a ANON.
Prilog evropskoj bibliografiji o dudovcu.
(A contribution to the European bibliography on *Hyphantria cunea*.)
Zashit. Bilja, Belgrade, 1953, No. 16/17, pp. 176-8.
Fifty-six recent articles listed.
- b BENEDICT, R. G.
Antibiotics produced by actinomycetes.
Bot. Rev., 1953, 19: 229-320, bibl. 251.
A review of their chemical, physical and biological properties.
- c BOGAVAC, M.
Neka zapažanja o parazitima dudovca.
(Some observations on the parasites of the fall webworm, *Hyphantria cunea*.) [English summary 2 pp.]
Zashit. Bilja, Belgrade, 1953, No. 16/17, pp. 58-80, bibl. 4, illus.
Ten parasites of the caterpillars and 8 of the pupae discussed.
- d BRIEN, R. M., AND DINGLEY, J. M.
First supplement to "A revised list of plant diseases recorded in New Zealand" 1949-51.
N.Z. J. Sci. Tech., Sect. A, 1953, 34: 556-62, bibl. 17.
See *H.A.*, 22: 3713b.
- e CORLISS, J. M.
Gypsy moth control activities in the north-eastern region.
J. econ. Ent., 1953, 46: 175.
Of the U.S.A.
- f CUTRIGHT, C. R.
Controlling *Anuraphis roseus* and *Aphis pomi*.
J. econ. Ent., 1953, 46: 379-81.
Materials and methods.
- g DAY, M. F., AND IRZYKIEWICZ, H.
Feeding behaviour of the aphids, *Myzus persicae* and *Brevicoryne brassicae*, studied with radiophosphorus.
Aust. J. biol. Sci., 1953, 6: 98-108, bibl. 14, illus.
And relation to the transmission of viruses by aphids.
- h GUNTHER, F. A., AND BLINN, R. C.
Pesticide residues, basic principles for quantitative determination.
J. agric. Food Chem., 1953, 1: 325-30, bibl. 55.
A review.
- i HASE, A.
Beobachtungen über die Lebensfähigkeit und Möglichkeiten der Verbreitung von Altraupen des Weissen Bärenspinners. (Observations on longevity and spread of fall webworm larvae.)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1953, 5: 86-9, bibl. 9, illus.
It is concluded that *Hyphantria cunea* may be spread by movement of old larvae. See *H.A.*, 22: 3687.
- j KOBEL, F.
Zur Diagnose der Steinobstvirosen. (The diagnosis of virus diseases in stone fruit.) [English summary 12 lines.]
Phytopath. Z., 1953, 20: 353-74, bibl. 51.
A review of American literature.
- k KÖHLER, H.
Antibiotika und ihre Bedeutung in der Pflanzenpathologie. IV Teil. (Antibiotics and their significance in plant pathology. IV.)
NachrBl. dtsh. PflSchDienst, Berlin, 1953, 7: 108-13, bibl. 40.
For references to Parts I-III of the review see *H.A.*, 23: 2947r.
- l KUENEN, D. J.
Anthonomus pyri Koll and its attack on pears in the Netherlands.
Pap. 8th int. Congr. Ent., Stockholm, 1950, pp. 5, illus.
- m MARTIN, J. T.
The chemical standardisation of insecticides and fungicides.
Science and Fruit, 1953, pp. 246-55.
- n MICHELbacher, A. E., AND BACON, O. G.
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Adv. Leaf. Minist. Agric. Lond. 225, revised
1953, pp. 4, illus.
- v MINISTRY OF AGRICULTURE, LONDON.
Red core of strawberry.
Adv. Leaf. Minist. Agric. Lond. 410, 1953,
pp. 4, illus.
- w NOVAKOVIĆ, V.
Pojava i suzbijanje dudovca u Bosni 1952
godine. (The appearance and control of fall
webworm in Bosnia in 1952.) [German
summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1953, No. 16/17,
pp. 122-3.
Mechanical destruction of caterpillar nests
proved satisfactory.
- x PAGE, P. R.
Windbreaks and shelter belts.
Comm. Grower, 1953, No. 2999, pp. 1294-5.
Some suitable tree species for Britain.
- y ROMANELLI, O.
La protezione delle colture frutticole
veronesi. (Fruit crop protection in Verona.)
Not. Mal. Piante, 1953, No. 22, pp. 6-14.
Mainly apple, peach, cherry and pear.
- z ROSS, H. H.
Another European cherry leafhopper in
North America.
J. econ. Ent., 1953, 46: 177, illus.
Erythroneura flammigera in Vancouver, B.C.
4096.
a SISOJEVIĆ, P.
Exorista fallax Meigen (Dipt., Tachinidae)
a parasite of the fall webworm. (Preliminary
report 1952.) [Serbian, with English sum-
mary pp. 2.]
Zasht. Bilja, Belgrade, 1953, No. 16/17,
pp. 5-18, bibl. 9, illus.
- b ŠMIT, I., AND MACELJSKI, M.
Dudovac ma područjū NR Hrvatske u
1952 godini. (Fall webworm in Croatia in
1952.) [French summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1953, No. 16/17,
pp. 108-14, illus.
Controlled by dust, spray and mist blower
applications of DDT and BHC.
- c WILLISON, R. S., AND WEINTRAUB, M.
Studies on stone-fruit viruses in cucurbit
hosts. I. A method of evaluating the infec-
tivity of infectious juice. II. Some factors
affecting the aging of inoculum *in vitro*.
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tivity.
Phytopathology, 1953, 43: 175-7, 324-8, bibl.
4, and 328-32, bibl. 4, resp., being *Contrs*
Div. Bot. Plant Path., Sci. Serv., Dep.
Agric., Ottawa 1175, 1240 and 1241.
- d WOODCOCK, D.
The insecticidal activity of DDT and related
compounds.
Science and Fruit, 1953, pp. 256-64, bibl. 42.

WEEDS AND WEED CONTROL.

General.

(See also 4143f, j, 4624, 4747.)

4097. BRAGG, K. K. (Chairman).
Report of the Herbicide and Weed Classifica-
tion Committee.

Proc. 6th Mtg east. Sect. nat. Weed Cttee
1952, Quebec, 1953, pp. 115-24.

The following information is included in tabular form:
selective weed control in horticultural crops, soil
sterilants, control of specific weeds, and brush and weed
classification according to response to 2,4-D.

4098. MINARIC, C. E., AND NORMAN, A. G.
Herbicides; chemical weed control.
BARRONS, K. C.
Herbicide application; some considerations
in choosing methods.
FREED, V. H.
Herbicide mechanism; mode of action other
than aryl oxyalkyl acids.
CRAFTS, A. S.
Herbicides, their absorption and translocation.
J. agric. Food Chem., 1953, 1: 42-4, bibl. 4;
45-7, bibl. 4; 47-51, bibl. 50; 51-5, bibl. 3,
resp., illus.

Chemical weed control is reviewed in this herbicide
symposium. In the last paper, radioactive tracer studies
on absorption and translocation of 2,4-D in young bean
plants are described. It is concluded that absorption is
rapid and that the chemical passes through the vascular
system at rates of up to 100 cm. per hour. J.S.

4099. LINDSAY, D. R.
Weed survey methods.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
1952, Quebec, 1953, pp. 109-14, bibl. 5.

The types of survey considered are: general recon-
naissance, intensive survey, and sampling methods.
One of the sampling techniques, used in Ontario and
Quebec, is discussed in detail.

4100. NEILL, S. A.
Noxious weeds.
Proc. 5th N.Z. Weed Control Conf. 1952,
Canterbury agric. Coll., pp. 75-80.

A general discussion on weed control in New Zealand
with special reference to the implementation of the
Noxious Weeds Act.

4101. GORDON, D. V.
Weed control in England.
Proc. 5th N.Z. Weed Control Conf. 1952,
Canterbury agric. Coll., pp. 85-8.

General notes on methods and materials used in weed control and on the critical attitude British research workers have to the current flood of new chemicals and claims.

4102. HANF, M.

Verwachsungen an Laubblättern und in Kompositenköpfchen, verursacht durch wuchsstoffhaltige Unkrautbekämpfungsmittel. (Coalescence in leaves and in capitula of composites, induced by hormone herbicides.) *Planta*, 1953, 81: 515-24, bibl. 5, illus.

Illustrated descriptions are given of coalescence and other malformations in *Anthemis arvensis*, *Senecio vulgaris* and *Plantago lanceolata* following the application of hormone herbicides.

Particular weeds.

(See also 4143d, i.)

4103. N.S.W. DEPARTMENT OF AGRICULTURE.

Beware of this weed! (*Bidens pilosa*).

Agric. Gaz. N.S.W., 1953, 64: 171.

Bidens pilosa was recently discovered to be a host of the spotted wilt virus of tomato. In an outbreak at Somersby it served as a reservoir from which the disease was transmitted to tomato crops.

4104. MATTHEWS, L. J.

The chemical control of Californian thistle. *Proc. 5th N.Z. Weed Control Conf. 1952*, Canterbury agric. Coll., pp. 32-5.

Conditions most favourable for the control of Californian thistle by 2,4-D and MCP spray applications are described. Crops that will tolerate 0.5 lb. acid equivalent per acre of the sodium salt of MCP include peas, asparagus and strawberries.

4105. VOIGT, G. K.

The effect of chlordane on the growth of chickweed (*Stellaria media* (L.) Cyrill) and purslane (*Portulaca oleracea* L.). *Agron. J.*, 1953, 45: 270.

Results obtained in nursery and greenhouse trials in Wisconsin indicate the possibility of controlling certain weeds with 50% technical chlordane dust applied at the rate of 100 lb. actual chlordane per acre [see also *H.A.*, 22: 1488 and 23: 2972].

4106. DAY, B. E.

Present status of nutgrass problem. *Calif. Citrogr.*, 1953, 38: 292-4.

Small new colonies of both purple nutgrass (*Cyperus rotundus*) and yellow nutgrass (*C. esculentus*) can be destroyed by fumigation with methyl bromide under a tarpaulin. Existing large-scale infestations of purple nutgrass can be effectively controlled in dry, well-tilled soils by chlorobromopropene, DD or EDB (without a tarpaulin) at minimum rates of 80, 80 and 60 gal. per acre respectively injected 8 in. deep at a spacing of 12 × 12 in., provided that the surface 1-2 in., which will not retain enough vapour to kill the tubers, is sufficiently dry and well-tilled for them to die from desiccation. Yellow nutgrass is not reliably controlled by these fumigants. In orchards and vineyards, where

fumigation is hazardous, both species can be controlled by frequent destruction of top growth over a period either with oil herbicides or 2,4-D. Purple, but not yellow, nutgrass can also be controlled by tillage, provided the soil is dry to the maximum depth of the tubers (2-3 ft. in sandy soils), and is ploughed below the depth of the lowest tubers so as to cut the roots connecting them with moist soil below.

4107. MUÑOZ OROZCO, E.

El control de las cyperaceas (cortadera, coquito, etc.) con los diferentes mata-malezas. (Control of some *Cyperus* spp. with various herbicides.) *Acta Agron. Palmira*, 1953, 3: 99-121, bibl. 19, illus.

Notes are given of experiments on the control of nutgrass, *Cyperus rotundus*, and other Cyperaceous weeds with various herbicides. Nutgrass was effectively controlled by spraying with the free acid of 2,4-D at 1,500-3,000 p.p.m. or 2,4,5-T at 3,000 p.p.m. in water-alcohol solution or in MCPA.

4108. HOLLOWAY, J. K., AND HUFFAKER, C. B.
Establishment of a root borer and a gall fly for control of klamath weed.

J. econ. Ent., 1953, 46: 65-7, bibl. 4.

Notes are given on the performance of a gall fly, *Zeuxidiplosis giardi*, and a root borer, *Agrilus hyperici*, introduced from Europe to California in 1950 for biological control of klamath weed (St. John's wort), *Hypericum perforatum*.

4109. CLARK, N.

The biology of *Hypericum perforatum* L. var. *angustifolium* DC (St. John's wort) in the Ovens Valley, Victoria, with particular reference to entomological control. *Aust. J. Bot.*, 1953, 1: 95-120, bibl. 16.

Studies are reported on the environment of the weed and the effect of habitat on growth and vegetative reproduction, the effects of defoliation both by hand and by the leaf-eating beetles *Chrysomela gemellata* and *C. hyperici*, and on the regeneration of the weed from seed. It is concluded that St. John's wort possesses characteristics which make it a difficult subject for effective entomological control.

4110. AKHURST, C. G.

Chemical weed control on rubber estates in Malaya. *Arch. Rubbercult.*, Extra No. May 1953, pp. 155-60.

Short notes on the control of *Imperata arundinacea* with various chemicals, on the control of weeds other than the above, on the response of different covers to weedkillers, and on spraying equipment.

4111. O'CONNOR, B. A.

An introduced parasite of the Noogoora burr. *Agric. J. Dep. Agric. Fiji*, 1953, 23: 105-6.

The seedfly, *Euresta aequalis*, which breeds in the fruits of the weed, Noogoora burr, *Xanthium italicum*, was introduced into Fiji in 1951 with a view to controlling the host.

Control of woody plants.

(See also 4143b.)

4112. SEWELL, T. G.

The chemical control of sweet briar.*Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 55-7, bibl. 3.*

The most effective treatment for the control of sweet briar, *Rosa rubiginosa* or *R. eglanteria*, appears to be the butoxy ethanol ester of 2,4,5-T applied at 1:500 concentration. The method, however, is not practicable on sites inaccessible to mechanical equipment or far removed from ample water supply.

4113. JONES, I. E.

The control of riverbed growth.*Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 40-2.*

For the control of riverbed growth, consisting mainly of willows and broom up to 3 ft. high, 3 lb. of 2,4-D per acre in 100 to 150 gal. was found satisfactory. Methods of controlling taller growth with 2,4-D are discussed. Overall spray treatment of mature trees, while experimentally successful, is considered impracticable, but stump treatments gave good results.

Weed control in turf and ornamentals.

4114. BOYCE, J. H.

The control of turf weeds.*Proc. 6th Mig east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 80-8.*

Most of this paper deals with practices which prevent weed infestation both in the establishment and maintenance stages of turf culture. Chemicals used in the past for weed control in turf are briefly discussed and the most satisfactory of those, such as sodium arsenite and potassium cyanate, together with 2,4-D and PMAS are recommended for present-day use.

4115. DANIEL, W. H.

The use of 2,4,5-T for clover control in turf.*J. Pk Adm., 1953, 18: 25-7.*

The results, summarized here, of trials in Indiana have shown that 1 lb. acid equivalent of amine 2,4,5-T per acre applied in the autumn will effectively reduce clover in turf. 2,4-D at 0.5 lb. acid equivalent may be added if broad-leaved weeds are present. Turf consisting of matted creeping bent grass may be injured by 2,4,5-T, if this is applied when the soil is dry.—Purdue Univ.

4116. BING, A.

Chemical weed control for gladiolus.*Bull. N.Y. St. Flower Grs, 1953, No. 92, p. 3.*

At the Ornamentals Research Laboratory, Farmingdale, N.Y., Sinox E, a dinitro compound, at 1 gal. per 100 gal. water per acre, proved to be a very effective pre-emergence spray for gladioli. For both pre- and post-emergence treatments 2,4-D wettable powder at 1 lb. active ingredient/100 gal./acre, TAT GW at 5-6 qts/100 gal./acre and Crag 1 at 3 lb./40 gal./acre gave very good weed control early in the season. Other possible herbicides are mentioned.

4117. PEABODY, D. V.

Preliminary investigations of chemical weed control in bulb crops.*Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 39-40.*

In trials at the North-western Washington Experiment Station with irises, pre-emergence applications of dinitro amine at 13.5 lb. per acre and CMU at 4 lb. per acre gave control with little or no crop injury. For post-emergence applications in iris CMU at 4 lb. and maleic hydrazide at 16 lb. per acre were satisfactory. In tulips, pre-emergence applications of dinitro amine at 11.25 lb. and CMU at 4 lb. per acre, and in daffodils post-emergence applications of 3-chloro IPC at 4 lb. and CMU at 1 lb. per acre gave the best results.

Weed control in vegetable crops and tobacco.

(See also 4757.)

4118. MARVEL, M. E.

Cauliflower seedbed fumigation with methyl bromide.*Curr. Rep. W. Va agric. Exp. Stat. 2, 1952, pp. 9, illus., and Down to Earth, 1953, 9 (1): 12-14.*

Cauliflower seedbeds in the field were treated with methyl bromide applied under a plastic cover 7 days before sowing at $\frac{1}{2}$, 1 and 2 lb. per 100 sq. ft. Grasses were completely eradicated and broad-leaved weeds were reduced more than 99% by all treatments. Pre- and post-emergence damping off and other soil-borne diseases were markedly reduced, insect injury was decreased and plant vigour was increased as a result of the treatments.

4119. ROBERTS, H. A.

Weed investigations.*A.R. nat. Veg. Res. Stat. Wellesbourne for 1952, 1953, pp. 41-2, bibl. 2.*

Studies on the ecology of important weeds of vegetable crops have been initiated to provide a basis for the application of control measures. In onions and lettuce, pre-emergence applications of mineral oils containing pentachlorophenol as a fortifying agent resulted in very good weed control without crop injury. Trials of various pre-emergence treatments were carried out with peas and red beet, and successful post-emergence applications of DNBP (ammonium 2,4-dinitro-6-secondary butylphenate) were made in peas. In exploratory tests with CMU, applied pre-emergence at $\frac{1}{4}$ to 4 lb. per acre in 100 gal., excellent weed control was obtained in several vegetable crops. The great importance of rainfall on the action of CMU was noted.

4120. LYNCH, P. B.

The chemical control of grassy weeds.*Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 21-7, bibl. 10.*

Results of trials on grassy weed control both in New Zealand and abroad are discussed. For the control of annual grasses in certain horticultural crops such as peas and brassicas applications of TCA and IPC are recommended.

4121. VENGRIS, J., AND OTHERS.

Chemical composition of weeds and accompanying crop plants.*Agron. J., 1953, 45: 213-18, bibl. 13, being Contr. Mass. agric. Exp. Stat. 863.*

Weeds in onion fields are among those for which data on composition are tabulated. Their N and P contents

were about twice those of onion, and K and Mg accumulation in the weeds was even more pronounced. Most weed species had a lower Ca content than onions.

4122. DE QUERQUIS, F., MARTINO, C., AND LIGUORI, O.

Le erbe spontanee più frequenti nei semenzai e nei campi di tabacco. (Common weeds in tobacco nurseries and farms.)

Tabacco, 1953, 57: 154-68.

Notes on the ill effects and the control by mechanical and chemical means of common weeds in tobacco nurseries and farms in Lecce and in Monteroni and adjacent parts of the Arno valley. Seventeen weeds are illustrated. The most injurious are *Agropyron repens* (couch grass) and *Cyperus rotundus* (nutgrass).

Weed control in guayule.

4123. BURDENSKI, D., AND LAGUNGE, E. G.
Los distilados de petroleo utilizados como herbicidas de las malezas de los almacigos de guayule. (Petroleum distillates as herbicides in guayule nurseries.)

Bol. Prod. Fom. agric., B. Aires, 1952, 4 (31): 2-14, illus., from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 17533.

Various petroleum derivatives gave satisfactory weed control in guayule nurseries. Costs were low compared with hand weeding and guayule seedlings grew better.

Soil sterilants.

4124. SUGGITT, J. W.
Recent observations on soil sterilization chemicals.
Proc. 6th Mtg east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 102-5.

At present the most promising permanent (more than 2 years) soil sterilants appear to be Paris green applied at 6 lb. per 100 sq. ft. and creosote at 2 to 5 gal. per 100 sq. ft. depending on soil type. Of the temporary soil sterilants, which last for only 1 growth season, ammonium sulphamate at 2 lb., sodium TCA at 2-4 lb. and CMU at 1-2 lb. per 100 sq. ft. gave the best results.

4125. JACKS, H.
Soil disinfection. XIV. Effect of chemical soil disinfectants on control of weeds.
N.Z. J. Sci. Tech., Sect. A, 1953, 34: 487-91, bibl. 3.

The effect on weeds of chloropicrin, D-D, formalin, isobrome II, carbon disulphide and some mixtures of these soil disinfectants was investigated in nursery and glasshouse soils. Chloropicrin was the most effective. Chloropicrin and D-D (each at 3, 6 and 12 ml. per cu. ft. soil) considerably reduced weed seed emergence but neither gave satisfactory control of clover and grass seeds.—D.S.I.R., Auckland.

Herbicides and equipment.

(See also 4089, 4143a, c, e, g, h, 4609.)

4126. LATZKO, E., AND AMBERGER, A.
Über die Wirkung des Cyanamids (H_2CN_2) in der Pflanze. (The action of cyanamide in the plant.)
Naturwiss., 1952, 39: 526, from abstr. in *Z. PflKrankh.*, 1953, 60: 316.

The absorption of cyanamide and its action in the plant was studied in neutral water culture, the following symptoms of H_2CN_2 injury being generally observed: The leaf tips and margins became flaccid, subsequent yellowing occurred and necroses developed either in these parts or in the whole leaf, according to concentration. Very small amounts of cyanamide stimulated growth after causing initial injury. H_2CN_2 was shown to be absorbed by roots, stems and leaves. Susceptibility of plant species to the chemical was found to vary.

4127. WEINTRAUB, R. L.
2,4-D, mechanisms of action.
J. agric. Food Chem., 1953, 1: 250-4, bibl. 44.

From a review of the literature the author puts forward his hypothesis of the mode of action of 2,4-D. The development of the growing point with normal leaves and stems depends on the polarized division of meristematic cells, polarity being controlled by endogenous auxin. Structurally related compounds such as 2,4-D compete with auxin for these substrates and bring about a deficiency of the auxin complex which is essential for normal growth. Mild deficiency appears as a formative malformation of the leaves, more severe deficiency as proliferation and galling of the leaf and stem. With polarity destroyed, the abnormal growth pattern leads to widespread derangement of metabolic and physiological processes and ultimately to death—though it is thought that in many cases death may be due to reduced resistance to disease. J.S.

4128. LINDEN, G.
Neues zur Wirkungsweise der 2,4-D. (New observations on the action of 2,4-D.)
Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 115-19, illus.

In glasshouse trials applications of 2,4-D at concentrations below the threshold value, repeated at 2-3 day intervals, reduced the susceptibility of *Sinapis alba* to the herbicide. However, if the treatment was repeated at intervals of one day only, susceptibility was generally increased. There was no visible difference between untreated controls and plants treated with 2,4-D at concentrations below the threshold value. The increase in resistance cannot therefore be attributed to anatomical effects of the growth substance. On pre-treatment with a low concentration of 2,4-D just above the threshold value (0.005%), the plants showed increased or reduced susceptibility to a second application at 0.05-0.1%, according to the time of treatment. If the second application was made while the effect of the first was still visible, susceptibility of *S. alba* was increased, whereas susceptibility was considerably lowered if the plants were allowed to recover from the first treatment. It is therefore advisable to spray perennial weeds repeatedly at short intervals. In the case of weeds that are difficult to control, it would be advantageous to lower resistance by pre-treatment at a low concentration. As a side-effect of 2,4-D applications the incidence of *Rhizoctonia* attack was increased to 80-4%, as compared with 2.5% in untreated *S. alba*. Observations on the translocation of 2,4-D in the plants and on the formation of tissue proliferations are also recorded.—Landwirtschaftl. Hochschule, Stuttgart-Hohenheim.

4129. CHAMBIONNAT, A.

Neutralisation de l'activité herbicide du 2,4-D. par les eaux calcaires. Causes et remèdes. (Neutralization of the herbicidal activity of 2,4-D by water containing lime. Causes and remedies.)

Terre maroc., 1953, 27: 99-100.

The Na salt of 2,4-D can partly or wholly lose its herbicidal efficacy through the presence of Ca or Mg salts in the spray water. Its efficacy can be restored by the addition of specified amounts of the salt.

4130. WARREN, J. C. R., AND GILLIES, A.

Volatility of 2,4-D and 2,4,5-T esters.

Proc. 6th Mtg east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 98-101, bibl. 4.

The relative volatility of 2,4-D and 2,4,5-T esters, as determined by the authors and other workers, is discussed. In determining several values a new radioactive isotopic tracer technique was developed, details of which are to be published later.

4131. GALLUP, A. H.

The absorption and respiratory effects of 2,4-dichlorophenoxyacetic acid as factors contributing to selective herbicidal activity. *Diss. Abstr.*, 1953, 13: 288-9, *Publ.* 5035 of 101 pages.

"From the results of this study it is concluded that while anatomical differences exist between plants which are sensitive to 2,4-dichlorophenoxyacetic acid and those which are tolerant, such differences cannot account for the selective herbicidal activity of the growth substance. The fundamental difference between the two groups of plants appears to be in the respiratory effects of growth substances and this difference is of sufficient magnitude to account for selective herbicidal action."—Univ. Mich.

4132. HITCHCOCK, A. E., ZIMMERMAN, P. W., AND KIRKPATRICK, H., Jr.

A simple, rapid biological method for determining the relative volatility of esters of 2,4-D and 2,4,5-T.

Contr. Boyce Thompson Inst., 1953, 17: 243-63, bibl. 13, illus.

Tomatoes were used as test plants in the biological method described for determining the relative volatility of different formulations of 2,4-D and 2,4,5-T. The technique consisted of enclosing a plant 2½-3 in. tall, together with a filter paper containing the required amount of solution in a paper bag for 24 hrs or less at 70-80° F. The volatility of an ester was affected by the concentration and amount applied to the filter paper, length of exposure and temperature. In order of decreasing sensitivity the responses were leaf modification, curvature of stem and leaves, proliferation of stem, inhibition of growth and killing. The quantity of 2,4-D ester required to induce a certain response was 30 to 1,000 times greater for vapour than for direct application.

4133. HERNÁNDEZ-MEDINA, E., MARTORELL, L. F., AND WOLCOTT, G. N.

The effects of wind-drift of weed-killer on some Puerto Rican trees.

Science, 1953, 118: 74-5, illus.

Some 600 papaw plants were seriously affected by

2,4-D applied to sugar cane 2,000 yds or more to the east. Injuries to cultivated plants by the drift of hormone herbicides applied to the cane crop are common in Puerto Rico. The roadside trees, *Thespesia populnea* and *Terminalia catappa*, were found to be sensitive indicators of plant susceptibility to weed killers.—Agric. Exp. Stat., Univ. Puerto Rico.

4134. MINSHALL, W. H., AND McLARTY, D. A.

Preliminary investigations on the effects of some urea compounds on the morphology and physiology of plant roots.

Proc. 6th Mtg east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 95-7.

Results are reported from dosage-response and cytological studies with 3-p-chlorophenyl-1, 1-dimethylurea (CMU), dichloral urea and a substituted isourea (pseudourea). Seeds of agricultural plants and weeds were germinated in 7 concentrations of these compounds, varying from 4 to 256 p.p.m. In low concentrations all 3 chemicals stimulated the root growth of some species, but none of them produced such stimulation uniformly in all plants. Increasing concentrations resulted in from partial inhibition of root hair growth to inhibition of germination. It is tentatively suggested that suppression of root growth by these 3 chemicals is effected by the suppression of mitosis.—Sci. Serv. Lab. and Univ. W. Ontario, London, Ont.

4135. JASMIN, J. J., AND FERGUSON, W.

CMU for weed control in horticultural crops.

Proc. 6th Mtg east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 61-6, being *Contr. Div. Hort., Exp. Fms Serv., Ottawa* 800.

The contradictory results obtained with CMU (3(p-chlorophenyl)-1, 1-dimethylurea) used as a pre-emergence horticultural herbicide are discussed, and a table is presented showing that while 2 workers found CMU at 3 lb. per acre safe in beans, others noted crop damage at 1 lb. per acre. The range of tolerance shown by beet, cabbage, carrot, cucumber, lettuce, onion, parsnip, spinach, pea and radish is included in the table. It appears that the effects of CMU are greatly influenced by environment, i.e. soil type, precipitation, temperature and season. No report is available on the use of CMU in any of the perennial or biennial horticultural crops, and it is questionable if this chemical could be of any value there because of its residual effect in the soil. The limited amount of fundamental work done with CMU shows that it prevents mitosis and causes the cells to enter into a permanent resting stage.

4136. SNYDER, G. R.

Report of residual results with CMU weed killer on railway rights-of-way, 1952.

Proc. 6th Mtg east. Sect. nat. Weed Cttee 1952, Quebec, 1953, pp. 55-7.

From the data presented it is concluded that under average right-of-way conditions in Eastern Canada 20 to 40 lb. CMU per acre will give nearly perfect control, for 2 years, of all grasses and weeds with the possible exception of horsetail. In very heavily infested areas a light CMU+2,4-D follow-up treatment may be required in the second year; this will eliminate horsetail.

4137. PASS, H. A.
Summary of Canadian test data on Crag Herbicide No. 1.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 50-4.

Good weed control was obtained with sodium 2,4-dichlorophenoxyethyl sulphate (Crag Herbicide No. 1), applied pre- or at the time of emergence, in strawberries, fruit and ornamental evergreen nurseries, and vegetables.

4138. FOX, W. B.
The history and development of MCP.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 42-6, bibl. 25.

This review includes a comparison of MCP with 2,4-D, from which it is concluded that the greatest value of MCP appears to be its lack of toxic effect upon a large group of crop plants, permitting definite yield increases wherever competitive weeds are controlled.

4139. CRUICKSHANK, J. A.
Summary of 1952 experiments with naphthyl phthalamic acid.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 67-8.

Naphthyl phthalamic acid (Alanap) appeared to be suitable for the control of annual weeds in cucurbits, gladioli, asparagus, peas and crabgrass in turf.

4140. LEEFE, J. S.
"Premerge" as a pre-emergence herbicide.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 40-1, bibl. 4.

"Premerge" is an alkanolamine salt of dinitro-o-sec-butyl phenol. In general, it was found satisfactory as a pre-emergence herbicide at 4 to 8 lb. per acre in large seeded crops such as peas and beans, and is also reported to be effective in gladioli and peony.

4141. WILSON, J. S.
The present status of TCA and dinitros.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 35-9.

For the selective control of annual grasses (foxtail, crabgrass) in asparagus, cabbage, cauliflower, red beet and gladioli, 7 to 10 lb. of sodium TCA 90% in 10 gal. per acre is recommended for pre-emergence application. The principal uses of the dinitros are: 1. as non-selective contact weed killers in grapes and bush and top fruits; 2. for selective weed control in peas and other legumes; 3. for residual pre-emergence weed control in peas, beans and some agricultural crops; and 4. as pre-harvest sprays of legume seed crops to facilitate harvesting operations.

4142. COOPER, D. J.
New developments in spray equipment for weed and brush control.
Proc. 6th Mtg east. Sect. nat. Weed Cttee
 1952, Quebec, 1953, pp. 70-3, illus.

Modifications already made to equipment are discussed, and further suggestions are made which would improve the present-day sprayer and render it more suitable for the application of general purpose herbicides.

Noted.

- 4143.
- a ALDRICH, R. J.
Herbicides: residues in soil.
J. agric. Food Chem., 1953, 1: 257-60, bibl. 50.
 A review.
 - b BEATTY, R. H.
Brush control; status of chemical methods.
J. agric. Food Chem., 1953, 1: 178-81, bibl. 24.
 - c CROSSBIE, C. J.
Some characteristics of low volume nozzles.
Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 69-73.
 - d FLAY, A. H.
The control of grassy weeds by mechanical aids.
Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 17-20.
 - e GUNDESEN, B. D.
Recently developed chemicals.
Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 81-4.
 A review.
 - f HEALY, A. J.
The introduction and spread of weeds.
Proc. 5th N.Z. Weed Control Conf. 1952, Canterbury agric. Coll., pp. 5-16, bibl. 22.
 - g KELLY, J. A.
Commercial herbicides: present methods of formulation.
J. agric. Food Chem., 1953, 1: 254-7, bibl. 1.
 - h STAHLER, L. M.
Contact herbicides as preharvest defoliant or desiccants.
J. agric. Food Chem., 1953, 1: 183-7, bibl. 10.
 - i VINK, A. P. A., AND VAN ALPHEN DE VEER, E. J.
Mechanical and chemicalalang control.
Arch. Rubbercult., Extra No., May 1953, pp. 161-6, bibl. 6.
 English summary of Dutch article in *Bergcultures* [see *H.A.*, 23: 1788].
 - j WOLF, D. E.
Weed control; pre-emergence methods.
J. agric. Food Chem., 1953, 1: 181-3, bibl. 10.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 3751, 3991, 4000, 4025, 4418, 4734, 4746, 4750.)

4144. EWAN, J. W.

Horticulture under ideal conditions.

Agriculture, Lond., 1953, 60: 184-90.

Notes are given on the glasshouse industry (tomatoes, lettuce and chrysanthemums), outdoor vegetable crops (of which cabbage and savoys, canning peas and sprouts cover the largest areas) and strawberries in the Fylde and Ormskirk Plain in Lancashire. [See also *H.A.*, 23: 1832.]

4145. LAMM, R., TOMETORP, G., AND ÅVALL, H. Klassificerande sort- och stamförsök med köksväxter 1948-1952. (Vegetable variety trials 1948-52.) [English summary 3 pp.] *Medd. Trädgårdsförs. Malmö* 80, 1953, pp. 42, bibl. 17.

Prior to incorporation in the official Swedish variety register the varieties and strains submitted for testing are grown for two years at Alnarp and, with the exception of glasshouse crops, at one of six other Government research stations in different parts of Sweden. After the conclusion of the trial the approved varieties are listed as "first class élite" or "first class". The tests reported here were carried out with lettuce, pea, cabbage, melon, radish and spinach.

4146. FJÄDERHANE, A. M. Arbetsstudier i trädgårdssodlingen. (Time studies in horticulture.) *Medd. Alnarpsinst. Trädgårdssavd. trädgårdsekon. Byrån* 13, 1952, pp. 69.

For a brief outline of the time-study scheme see *H.A.*, 23: 1434. In the present bulletin the author analyses a great variety of cultural operations under glass and in the open, carried out on vegetables and flowers.

4147. VOGEL, G.

Untersuchungen über die arbeitswirtschaftlichen Anforderungen einiger Kulturen des landwirtschaftlichen Gemüsebaues. (Studies on labour requirements in vegetable growing.) *Kühn-Arch.*, 1952, 66: 180-225, bibl. 5.

Data on the labour requirements (man and horse hours) on farms and market gardens for growing the following vegetables are tabulated and discussed: onion, leek, carrot, cucumber, tomato, cabbage and cauliflower. Graphs illustrate the relationship between yield and man hours required for harvesting. The study was carried out in 1948 and 1949 in Sachsen-Anhalt, an area in central Germany with an annual rainfall of less than 500 mm.

4148. INDEN, T.

On the physiology of roots in vegetable crops.

III. Influence of leaves and stems on oxygen absorption by the roots of vegetables.

[Japanese, with English summary.]

J. hort. Ass. Japan, 1953, 22: 24-7, bibl. 7, illus.

A comparative study was made of oxygen absorption by the roots of 18 vegetables (a) with tops cut off, (b) with stems and leaves intact. In *Cryptotaenia japonica*,

Vigna sesquipedalis, *Colocasia antiquorum* and onion the oxygen supplied by stems and leaves amounted to over 20% of that required by the root, while carrot and Chinese cabbage (*Brassica pekinensis*) roots obtained only a small percentage of their oxygen requirements from the above-ground parts of the plant. A relationship was found to exist between tolerance to flooding and capacity of roots to absorb oxygen when submerged.

4149. GUSTAFSON, F. G.

Influence of photoperiod on thiamine, riboflavin and niacin content of green plants.

Amer. J. Bot., 1953, 40: 256-9, bibl. 4, being *Pap. Dep. Bot. Univ. Mich.* 969.

In this investigation thiamine, riboflavin and niacin content has been determined in the Alaska pea, Black Valentine bean and the San Jose Canner tomato, when subjected to 8-, 16-, and 24-hr photoperiods. It has been found that, in general, at temperatures of 14°, 20° and 26° C., there was a decrease in thiamine content as the plants were exposed to longer photoperiods. On the contrary, riboflavin and niacin concentrations increased with increase in the length of photoperiod. [Author's summary.]

4150. ELLIOTT, I. L., AND ADAM, J.

Vegetable growing on peat.

N.Z. J. Agric., 1953, 86: 331-6, bibl. 4, illus.

Trials begun at the Department of Agriculture Soil Research Station at Rukuhia in 1951 have shown that good vegetable crops can be grown on raw peat "waste land" despite the following characteristics of the peat: (1) winter waterlogging, (2) inadequate moisture in the surface layer in summer, (3) high acidity, (4) low available N, K, P and Ca, and (5) lack of certain minor elements. A description is given of a trial on 25-feet deep peat which was limed, cultivated, drained in winter, flood-irrigated in summer (to keep water tables constant at 8, 16 and about 30 inches) and fertilized. Good marketable crops of cabbage, lettuce, strawberry, onion and celery were produced, but silver beet, peas and maize were disappointing.

4151. HILL, H., BISHOP, R. F., AND CANNON, H. B.

The effect of various canning crop rotations on certain soil constituents over a five-year period.

Canad. J. agric. Sci., 1953, 33: 210-15, bibl. 4, being *Sci. Contr. Div. Hort., exp. Fms Serv., Ottawa* 796 and *Sci. Contr. Div. Chem., Sci. Serv.* 228.

Changes that have occurred in certain soil constituents during the initial 5-year period in nine different rotations with canning peas, tomatoes and corn are discussed. In a 2-year rotation of peas and tomatoes or peas and corn, where in addition to commercial fertilizer twelve tons of manure were applied every second year and two green manure crops were grown after harvesting the peas, an increase occurred in soil organic matter, exchangeable potassium and acid-soluble plus adsorbed phosphorus. Results from another rotation where the corn stover was returned to

the soil indicate that this practice helps to maintain soil organic matter. The highest yields of corn, peas and tomatoes occurred where manure was used and the highest average yields were obtained in 2-year rotations with uninterrupted production of canning crops. Reduced yields of peas and corn occurred when clover was seeded with these crops.

4152. LINDEN, R., AND TILKIN, N.

Les pulvérisations de sucre sur les plantes.

(Spraying plants with sugar.)

Bull. hort., Liège, 1952, 8: 172-5, bibl. 5.

American and Dutch research on sugar sprays is reviewed. The reviewers conclude that the treatment causes considerable increases in yield in certain cases but that, before it becomes current practice in horticulture, methods of application in relation to light, temperature and costs must be studied. Research at Gembloux has confirmed the following conclusions drawn by Went: (1) when the plants receive no artificial light, winter sprays increase yield; (2) for maximum efficacy of spraying a high day temperature and good light are necessary; (3) tomato plants sprayed beforehand withstand transplantation better than controls. Sugar sprays do not appear to suit leaf vegetables, especially lettuce.

4153. ISAACS, R. L., AND HESTER, J. B.

Plant nutrients; foliar applications to vegetable crops.

J. agric. Food Chem., 1953, 1: 239-40, bibl. 8.

Urea sprays, applied in conjunction with the normal spray programme of insecticides and fungicides, have been used effectively to supply nitrogen to tomatoes and carrots. Short-term experiments indicate that yields of carrots may be higher when nitrogen is applied in this way than when equivalent amounts are applied as fertilizer. By using a mixture of urea and ammonium nitrate, more nitrogen can be supplied without injury than by using either alone. Ammonium nitrate, however, cannot be used with sprays containing arsenic compounds unless lime is included in the mixture. Tomato plants grown in soil poorly supplied with nutrients and sprayed with a complete NPK mixture appeared to lose some of the nutrients, particularly phosphates, to the soil. It is concluded that the soil must be well supplied with phosphates if the plant is to be able to utilize nitrogen and potash supplied as spray. J.S.

4154. ANISIMOV, A. A.

The effect of nitrogen fertilizers on vitamin C content. [Russian.]

Sad i Ogorod, 1953, No. 6, pp. 41-3.

Data are presented showing that the moderate amounts of N applied in trials briefly described increased the vitamin C content of onion tops, cress [*Lepidium sativum*] leaves and pea leaves and seeds. Depression of vitamin C content as a result of N fertilization, often reported in the literature, is stated to be due to excessive doses.

4155. SARGENT, E. W.

Supplementary nitrogen application increases yield of vegetable crops.

Agric. Newsl., 1953, 21: 46-7.

Data compiled from tests throughout the United States indicate that Nu Green [urea] foliage sprays can be applied with routine insecticide treatments at the rate of 30-75 lb. per acre to supply the N requirements of vegetable crops. Safe maximum concentrations of the material are specified. The chemical can also be applied as a top dressing through irrigation water at the rate of 80-160 lb. per acre. Best results by either method have been obtained with applications at intervals of a week or more during the period of maximum need.

4156. TRUOG, E., BERGER, K. C., AND ATTOE, O. J.

Response of nine economic plants to fertilization with sodium.

Soil Sci., 1953, 76: 41-50, bibl. 9.

The response of red beet, rutabagas, carrots and celery to the addition of Na in their nutrient supply was investigated in pot experiments at Wisconsin University during 7 years. All essential nutrients except Na and K were supplied in balanced amounts; K and equivalent amounts of Na were added in varying amounts. Yields increased notably on the addition of sodium and generally vigour and quality also improved. In general, crops that respond notably to Na fertilization respond appreciably even when the level of K supply is adequate or high, whereas crops that respond only moderately when the supply of K is low do not respond appreciably when the supply of K is adequate. The crops that respond notably to additions of Na also absorbed considerable amounts of this element (celery contained up to 4%), especially under low levels of K supply; the crops that gave little or no response absorbed only small amounts, usually less than 0.2%.

4157. HARMER, P. M., AND OTHERS.

Factors affecting crop response to sodium applied as common salt on Michigan muck soil.

Soil Sci., 1953, 76: 1-17, being *J. Art. Mich. agric. Exp. Stat.* 1459.

An account is given of experiments conducted at Michigan Muck Experimental Farm between 1942 and 1948 to determine the response to Na as NaCl of vegetable and other crops grown on a deep muck soil largely of sedge origin. The Na was applied either as common salt or as mine-run potash containing NaCl at rates ranging from nil to 1,000 lb. per acre, and NPK fertilizer was also applied. Conclusions were: (1) responses by Na-responsive crops depend on the Na content of the fertilizer, the composition and drainage of the soil, the variety of the crop and the seasonal climate; (2) common salt and potash give comparable yield increases; (3) responses in general are better with good drainage than with poor and in a wet season than a dry one. Crops may be divided into 4 categories of Na response: (1) little or none even with insufficient K supply, namely cucumber, lettuce, onion, parsley, parsnip, peppermint, spearmint, spinach, squash and strawberry; (2) slight to medium even with insufficient K supply, namely asparagus, broccoli, sprouts, carrot, chicory, horse-radish and tomato; (3) slight to medium with ample K supply, namely cabbage, celeriac, kale, kohlrabi, pea and radish; (4) large response with ample K supply, namely celery, swiss chard and table beet.

4158. BUCHNER, A.
Über die Änderung des Mineralstoffhaushaltes durch Chloriddüngung bei Ammoniak- bzw. Nitraternährung. (The effect of chloride fertilizers on the metabolism of minerals, with ammonia or nitrates as a source of nitrogen.)
Z. Pflernähr. Düng., 1951, 55: 124-44, bibl. 20 [received Sept. 1953].
With ammonia as a source of nitrogen, chloride fertilizers had a much more unfavourable effect on growth and yield than when nitrate was the source. Absorption of Cl ions was increased in the presence of NH_4 and appreciably reduced in the presence of NO_3 . Application of nitrates can therefore be recommended as a remedy for chloride injury. The effect of chlorides on the ratio of nutrients taken up by the plants is discussed. Dwarf beans and buckwheat were used as test plants.—Agrikulturchem. Inst. Weihenstephan.
4159. BUCHNER, A.
Über den Einfluss der Chlorionen auf den Kohlenhydrat- und Stickstoffhaushalt der Pflanze bei Ammoniak- bzw. Nitraternährung. (The effect of chlorine ions on carbohydrate and nitrogen metabolism, with ammonia or nitrates as a source of nitrogen.)
Z. Pflernähr. Düng., 1952, 57: 1-29, bibl. 25.
Cl ions caused a markedly greater decrease in reducing sugar and saccharose content in plants supplied with NH_4 than in plants supplied with NO_3 . With NO_3 as a source of N, chlorides had a less unfavourable effect on carbohydrate metabolism when N applications were high, whereas with NH_4 the adverse effect of chlorides became more marked as N applications increased. Chloride fertilizers affected the protein metabolism favourably in the presence of NO_3 and unfavourably in the presence of NH_4 . Several disturbances of N metabolism, which are described, are attributed to ammonia poisoning. In the NO_3 series chlorides caused a reduction of the chlorophyll content in the fresh weight but not in the dry matter, while in the NH_4 series the reduction of the chlorophyll content in the dry matter was considerable. Tobacco, dwarf bean, buckwheat and rape were used as test plants.—Agrikulturchem. Inst. Weihenstephan.
4160. BAETGE, H. H., AND BEGEMANN, E.
Welche Schäden werden durch Überdüngungen mit Spurenelementen hervorgerufen? (What injuries are caused by excessive applications of trace elements?)
Festschr. tech. Univ. Berlin-Charlott., Abt. Gartenb., 1953, pp. 25-33.
In experiments on bean, lettuce, kale and tomato, carried out in 1948-50, it was found that: (1) B and Cr added to the soil as anions in excessive quantities caused typical injuries in all the plants tested, though the amount necessary to cause injury varied with the plant species; (2) excessive quantities of Zn, Mn, Cu, and Cr applied as cations may inhibit growth, depress yields, etc. but do not produce typical symptoms; (3) both typical and non-typical symptoms become more pronounced as applications of the element are increased.—Inst. f. Bodenkunde.
4161. BECKER, M. H.
Sprinkler irrigation costs and practices (Willamette Valley, Oregon, 1950).
Bull. Ore. agric. Exp. Stat. 532, 1953, pp. 24.
Mint, runner beans and other vegetables are included among crops considered in this economic survey of sprinkler irrigation practices.
4162. BEAN, G.
Washing crops brings dividends.
Grower, 1953, 39: 1069-71, illus.
The author, of the National Institute of Agricultural Engineering, discusses the value of washing vegetables and the various types of machine available.
4163. RIKOVSKI, I., AND DJORDJEVIĆ, V.
Uticaj stajanja na sadržaj askorbinske kiseline u ubranom povrću. (The effect of storage on the ascorbic acid content of vegetables.) [English summary 1 p.]
Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 72-82, bibl. 5.
Experimenting with spinach, lettuce and tomatoes, the authors found that the ascorbic acid content fell rapidly during storage at room temperature, while in cold storage at 4-5° C. the decrease was more gradual. The outer leaves of lettuce had practically the same content as the heart. Tomatoes showed the highest ascorbic acid content when red, firm but not fully ripe, and of the 5 varieties tested Skoplje Globe was the richest in ascorbic acid, averaging over 40 mg. %.
4164. NEERGAARD, P.
Betydningen af frøkontrolforanstaltninger som led i bekæmpelsen af plantesygdomme, hvis smitstof følger med frø. (The significance of seed testing institutes in the control of seed-borne diseases.)
Nat. Verd., Kbh., 1952, 36: 273-94, bibl. 12, illus.
Seed-borne diseases, most of them on vegetables, are discussed with special reference to the international seed trade and to the functioning of the Danish seed testing service.
4165. JACKS, H.
Seed disinfection. VI. Surface disinfection of vegetable seeds.
N.Z. J. Sci. Tech., Sect. A, 1953, 34: 492-5, bibl. 4, illus.
The results are given of tests in which the efficiency of cuprocide, spergon, panogen, thiram, ferbam, Dow 9 B, and 36L for surface disinfection of various vegetable seeds was compared with that of the laboratory methods of washing in running water or dipping in HgCl_2 , acidulated HgCl_2 or methylated ethyl alcohol. Panogen and spergon were the most effective (except for celery) and compared favourably with acidulated HgCl_2 . Thiram and ferbam were effective against many organisms but not against bacteria.—D.S.I.R., Auckland.
4166. BLUMER, S., AND HARDER, A.
Über die Beizung von Gemüsesamen. (On the disinfection of vegetable seed.) [French summary ½ p.]
Landw. Jb. Schweiz, 1953, 67: 315-35, bibl. 20, illus.

The action of 8 fungicidal dusts on bean, pea, spinach and carrot seed has been studied in glasshouse and field trials. Glasshouse trials showed that *Rhizoctonia solani* is satisfactorily controlled by preparations of spergon, phygon or thiuram (TMTD). In the field the effect of seed disinfection was most pronounced when germination was delayed as a result of either unfavourable weather or unsatisfactory seed quality. The best response was obtained from early sowings of peas, but spinach and beans also showed the beneficial effect of disinfection, while carrots were not benefited. A combined fungicide-lindane treatment was found to control storage and soil pests besides pathogenic soil fungi and moulds occurring in storage. Storage quality was not affected by seed disinfection. [Shortened translation of authors' summary.]—Wädenswil.

4167. DORAN, W. L.

Damping-off can be controlled.

Res. Rev. Mass., 1953, 2 (2): 14-15, illus.

Vinegar, applied at the rate of $\frac{1}{2}$ pt. per sq. ft. of soil a few hours before seeding, gives satisfactory control of damping-off in most soils, and is safe with cabbage, lettuce, tomato and some annual flowers. Watering with a very dilute solution of formaldehyde immediately after seeding is a well tried method, and of the newer organic fungicides phygon, arasan, dithane D-14, orthocide and vancide are recommended.

4168. VUKASOVIĆ, P.

O uticaju DDT i HCC (gameksana) na klijavost semena i porast mladih biljaka. (The effect of DDT and BHC on the germination and growth of young plants.) [French summary 2 pp.]

Arh. poljopr. Nauk., Belgrade, 1951, 4 (6): 76-86, bibl. 1 [received 1953].

DDT and BHC applied at rates of 1-10 g. per m² did not in general affect the germination of beans, barley, maize, peas and hemp, although at the rate of 10 g. per m² a slight retardation in the germination of maize was observed with DDT, and a general retardation of from 24 to 48 hrs of all plants with BHC. Beans only were studied in experiments on growth, and solutions of 0.5, 2.5 and 5% were used. No reaction to BHC was observed, but DDT reduced the length of the roots and stem, the number of leaves and the weight of the plant by the twentieth day after application.

4169. OTEIFA, B. A.

Development of the root-knot nematode, *Meloidogyne incognita*, as affected by potassium nutrition of the host. *Phytopathology*, 1953, 43: 171-4, bibl. 6, illus.

Experiments on lima bean plants showed that the excessive application of K favours the rapid development of the nematode, the number of days elapsing between inoculation and first egg production being 16, 24 and 40 with excessive, optimum and deficient K respectively. Previous experiments [see *H.A.*, 23: 695] had shown that excessive K also protects the plants to some extent from nematode injury.—Univ. Maryland and U.S. Dep. Agric., Beltsville.

4170. CHRISTIE, J. R.

Ectoparasitic nematodes of plants.

Phytopathology, 1953, 43: 295-7, illus.

The stubby-root nematode, *Trichodorus* sp., a serious pest of celery, cabbage, tomato and chayote in Florida, is among the ectoparasitic eelworms discussed.

4171. CHRISTIE, J. R.

The sting nematode can be controlled by soil fumigation.

Down to Earth, 1953, 9 (1): 8-9, bibl. 1, illus.

The sting nematode, *Belonolaimus gracilis*, is an important root pest of vegetables and strawberries in the south-eastern United States. In a test in Florida in 1952 a broadcast application of dolfume W-40 (ethylene dibromide) at 20 gal. per acre in the spring gave adequate protection to 2 successive susceptible crops, peppers and snap beans. [See also *H.A.*, 23: 456.]

4172. HOLDEMAN, Q. L., AND GRAHAM, T. W. Population trends of the sting nematode [*Belonolaimus gracilis*] under different crops in greenhouse pot culture.

From abstr. in *Phytopathology*, 1953, 43: 291.

The crops in question include squash, tomato, bell pepper, cucumber, strawberry, tobacco, watermelon and crabgrass.

4173. HANDFORD, R. H., AND PUTNAM, L. G.

Control of grasshoppers in vegetable crops and orchards.

Processed Publ. Canada Dep. Agric. Div. Ent. 86, 1953, pp. 5.

Notes on *Melanoplus bivittatus* and *M. mexicanus mexicanus* and their control by chlorinated hydrocarbon sprays and arsenical or chlorinated hydrocarbon baits.

4174. NIJVELDT, W.

Galmuggen van cultuurgewassen. II. Galmuggen schadelijk voor de groenteteelt in Nederland. (Gall midges of crop plants. II. Gall midges injurious to vegetable crops in the Netherlands.) [English summary $\frac{1}{2}$ p.] *Tijdschr. Plziekt.*, 1953, 59: 77-81, bibl. 5, illus.

Notes are given on the damage caused by *Contarinia nasturtii* and *Gephyraulus raphanistris* on brassicas and *Contarinia pisi* on peas, and on their biology, distribution and other host plants.

4175. GLENDENNING, R.

The European earwig and its control in Canada.

Processed Publ. Canada Dep. Agric. Div. Ent. 21, revised 1953, pp. 4.

Damage by earwigs to flowers, lettuce and celery is often heavy in Canadian gardens. Control by DDT or chlordane dusts and poisoned baits is recommended.

4176. MORETON, B. D.

Preliminary experiments with metaldehyde suspensions against slugs.

Plant Path., 1953, 2: 49-51, bibl. 1.

Water suspensions of powdered commercial metaldehyde were effective against slugs in field and laboratory

trials begun in 1951. In the field, spray applications equivalent to 1.7, 2.5 and 5 lb. per 100 gal. per acre resulted in 4.5, 5.7 and 6.3 slugs per sq. ft. on the surface one day after treatment compared with 0.6 in the control. In laboratory tests under humid conditions applications of 5 lb. per acre brought about kills of 90% and survivors did not feed for at least a fortnight; they retained effectiveness for 5 but not for 8 days, and had no phytotoxic effects on sprayed lettuce and sprouts; 2.5 lb. per acre would be necessary to obtain a good kill in weather unfavourable for the desiccation of immobilized slugs. The spray method is promising for seedbeds and more valuable crops such as lettuce, strawberries and flowers under cloches and Dutch lights.—N.A.A.S., Wye.

4177. N.S.W. DEPARTMENT OF AGRICULTURE,
ENTOMOLOGICAL BRANCH.
The vegetable weevil.

Agric. Gaz. N.S.W., 1953, 64: 266, illus.

Notes on *Listroderes costirostris* grubs and their control with Paris green or BHC bran bait.

4178. COREY, R. A., AND OTHERS.
Translocation studies with two new phosphate insecticides.

J. econ. Ent., 1953, 46: 386-7, bibl. 6.

The systemic acaricidal properties of 2 new organic phosphorus compounds, diethyl 2-chlorovinyl phosphate (Compound 1836) and dimethyl 1-carbomethoxy-1-propen-2-yl phosphate (Compound 2046), are presented. The materials, when applied to the lower leaves of broad beans, were quickly translocated to the upper leaves. [From authors' summary.]

4179. LANGFORD, G. S., HARDING, W. C., AND
LALL, B. S.
Newer insecticides for Japanese beetle control.

J. econ. Ent., 1953, 46: 262-5, bibl. 7.

A laboratory evaluation of dila (2-nitro-1, 1-bis (p-chlorophenyl) propane+2-nitro-1, 1-bis (p-chlorophenyl) butane), malathion, EPN, NPD and metacide for Japanese beetle [*Popillia japonica*] control.

Asparagus.

4180. REINECKE, V.
Asparagus.

Fmg S. Afr., 1953, 28: 179-80.

Notes are given on asparagus culture in South Africa. The varieties chiefly grown are the Washingtons. Requirements are sandy loam, good water supply for irrigation, and abundant farmyard manure or compost.

4181. SNEEP, J.
The significance of andromonoecy for the breeding of *Asparagus officinalis* L. [Dutch summary $\frac{1}{2}$ p.]

Euphytica, 1953, 2: 89-95, bibl. 10, illus.

The advantages of male over female asparagus plants are higher yields, earliness and increased longevity. Attempts have therefore been made in the Netherlands to obtain stocks consisting of male plants only. The most promising method is breeding from andromonoecious plants (plants bearing both male and

bisexual flowers), which occur in commercial fields to an extent of 0 to 2% of the number of male plants. Crossing andromonoecious (Mm) with male (Mm) plants gives rise to a certain proportion of homozygous male (MM) plants in the progeny. Further crossing of these MM plants with normal females (mm) gives an F generation consisting of male (Mm) plants only. An account is given of the methods used and results obtained at Wageningen. There are indications that the tendency to andromonoecy is hereditary. The practical advantages of this, including the possibility of selecting homozygous varieties and of inducing heterosis, are discussed.

4182. VAN DER VLIET, M.

De bestrijding van de aspergeroest. (The control of asparagus rust.) [English summary 9 lines.]

Meded. Dir. Tuinb., 1953, 16: 319-25, illus.

Trials carried out in Holland since 1949 have shown that asparagus rust (*Puccinia asparagi*) can be kept under control by spraying with zineb (dithane Z 78) at a concentration of 0.35%. A wetter is necessary. The first application should be made as soon as the uredospores are visible, and subsequent applications at intervals of 10 to 14 days. Asparagus yields were very favourably affected by zineb sprays.—Plantenziektenkundige Dienst, Wageningen.

4183. MICHELbacher, A. E., BACON, O. G., AND
UNDERHILL, J.

Garden centipede. Summer flooding has advantages in controlling pest in asparagus fields.

Calif. Agric., 1953, 7 (8): 5, illus.

The garden centipede (*Scutigera immaculata*), a serious pest of asparagus, can be controlled by flooding in the dormant season if the water is held on the field one foot deep for at least 2 weeks and the field is completely covered. Summer flooding requires much shallower water and a shorter period but possesses some serious disadvantages which are enumerated. Land to be planted to asparagus should be summer flooded.

Brassicas.

(See also 3707, 3763, 4118, 4271, 4289, 4327 I, p. 4749.)

4184. SHERRARD, G. O.
Conclusions of the Irish spring cabbage trials.

Comm. Grower, 1953, No. 3003, p. 120.

Trials were carried out at the Albert Agricultural College, Dublin, during the years 1951-53 with a view to finding spring cabbage varieties that were suitable for (a) marketing early in an unheated condition and (b) marketing early as a hearted cabbage. Observations are made on the performance of 9 leafy and 13 hearting varieties. Of the former, Tozer's Early Market is highly recommended and can be used as a dual purpose variety since it forms a good heart later. Nutting's Selected Offenham proved to be the best hearting variety.

4185. IWAMA, S., AND HAMASHIMA, N.
Ecological studies on vegetables in regions of different altitudes. 2. Behaviour of cabbage seedlings grown in a warm region of low altitude and planted in a cool region of high altitude. [Japanese, with English summary.]
J. hort. Ass. Japan, 1953, 22: 9-14, bibl. 14, illus.

Seedlings of the cabbage family to be grown at high altitudes in certain areas of Japan are raised at low elevations. In this study it was found that the seedlings should be transplanted before they have reached the 6-leaf stage to avoid various malformations on exposure to temperatures below 10° C. for more than 30 days.

4186. GILBERT, J. C.
Hot weather cauliflower culture.
Hawaii Fm Sci., 1953, 2 (1): 1, 8.

Trials with the Indian variety Pua Kea have shown that hot-weather strains of cauliflower can be grown successfully at lower elevations in Hawaii throughout the year. Buttoning was insignificant if transplanting was carried out not later than 4 weeks after sowing. At two places increases in yield were obtained from applications of 10 lb. B per acre and a shovelful of compost per plant respectively, in addition to a complete fertilizer. Curd rotting, probably attributable to several causes, was the most serious disease encountered in 4 years' experiments. The trouble can be largely avoided by growing the crop in a dry district and using furrow irrigation. The variety tested was found to mature in 80-90 days from seed.

4187. NORTH, C.
Experiments with root cuttings of brussels sprout.
Ann. appl. Biol., 1953, 40: 250-61, bibl. 10, illus.

A technique for the clonal propagation of promising varieties of brussels sprouts is described. In the experiments the proximal ends, 6 cm. long, of cleaned roots, 5-10 mm. in diameter, of autumn-lifted plants were used. After the removal of thin side roots the root portions were potted in sterilized coarse sand, placed in a greenhouse at 60-70° F. and watered daily. Adventitious shoots arose exogenously on callus tissue which developed around the base of the side roots. After the root cuttings had been potted for 6-8 weeks, these shoots were removed and planted as stem cuttings in sterile 50: 50 sand: vermiculite mixtures. After 10 days in a propagating case they had generally formed roots and were transplanted to pots. Means of preventing rotting and obtaining good budding are described.—*Nat. Inst. agric. Bot.*, Cambridge. [See also *H.A.*, 22: 2548 and 23: 3031.]

4188. LEBEDEV, F. K.
Raising cabbage without transplanting. [Russian.]
Sad i Ogorod, 1953, No. 4, pp. 48-9.

In the Jaroslav province in 1951 and 1952 medium and late cabbage, grown without transplanting, produced considerably lower yields than plants raised by conventional methods, but the early variety Slava was found suitable for direct seeding.

4189. BUHL, C.
Zur Symptomatik der Kohlkrankheiten: Herzlosigkeit und Dreherzmücke an Kohl. (On certain symptoms of cabbage diseases: Blindness and swede midge on cabbage.)
Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 175-9.

A curious malformation of the central leaves leading to blindness, which frequently occurs in the cauliflower plantations of western Schleswig-Holstein, has been attributed to injuries caused by *Contarinia nasturtii*. A close investigation, however, has shown that neither pests, plant pathogens, mineral deficiencies, damage by fertilizers nor sprays are responsible for the trouble. The symptoms, which are described, are believed to be identical with a condition which Wiebosch, of Holland, called klemhart [see *H.A.*, 22: 490]. This type of blindness has been observed mainly in early cauliflower sown in January-February and planted out in March-April. The results of preliminary experiments support the hypothesis that this type of blindness is related to the occurrence of low temperatures at a time when the plants are becoming established in the field. In addition, the unusually high N supply in the marsh soil may be conducive to the development of the trouble.—*Inst. f. Getreide-, Ölfrucht- u. Futterpflanzenbau*, Glückstadt.

4190. SMITH, N. M.
Blindness in early cauliflowers.
Agriculture, Lond., 1953, 60: 282-5.

Information available and limited trials with 3 susceptible varieties of early cauliflower, Remme, White King and All the Year Round, suggest that low temperatures when the plant is at a very early stage of growth may influence the incidence of blindness. In the tests briefly described autumn-sown plants suffered much more heavily from this disorder than those sown under glass in spring.—*Univ. Bristol*.

4191. ANON.
Klemharten in bloemkool. (Whiptail in cauliflower.)
Meded. proefst. Groent. Fruit. Glas, 1953, No. 5, p. 7.

An experiment at Naaldwijk has shown that better control of whiptail in cauliflower was obtained by applying Mo to the nursery soil than by spraying the plants with Mo either before or after planting out.

4192. ROLL-HANSEN, J.
Molybden til blomkål. (Molybdenum applications for cauliflower.)
Gartneryrket, 1953, 43: 275-7, bibl. 3, illus.

Applications of (1) lime, raising the pH in the field from 5.32 to 6.48; (2) ammonium molybdate to the soil in the frame at the rate of 3 g./m.²; and (3) ammonium molybdate to the soil in the field at the rate of 100 g./1,000 m.² increased cauliflower yields from 74 kg. per 1,000 m.² in the controls to 963, 859 and 762 kg. per 1,000 m.² in (1), (2) and (3) respectively and reduced whiptail from 86% in the controls to 9%, 3% and 1% respectively.—*Kvithamar Res. Stat.*

4193. HEATHCOTE, G. D., AND BROADBENT, L.
Virus diseases of cruciferous crops.
A.R. Rothamsted exp. Stat. 1952, 1953, pp. 86-7.

In two experiments seed-beds of cauliflower were

sprayed at 7-10 day intervals with systemic and other insecticides, but no treatment significantly reduced the incidence of cauliflower mosaic or cabbage black ring-spot virus. Although there are many potential aphid vectors, the viruses seem to spread in the field only when either *Myzus persicae* or *Brevicoryne brassicae* are active. Barriers reduced the number of infected plants per unit area and promise to be of practical value. Strips of barley and wheat proved more effective than strips of mustard and kale or than simple physical barriers.

4194. HAMLYN, B. M. G.

Quantitative studies on the transmission of cabbage black ring spot virus by *Myzus persicae* (Sulz.).

Ann. appl. Biol., 1953, 40: 393-402, bibl. 15.

Factors studied were the effects of previous fasting on the aphids' infective power and of length of infection-feeding and test-feeding times, and the relative infective power of winged and wingless aphids.—Rothamsted exp. Stat., Harpenden.

4195. SYLVESTER, E. S.

Brassica nigra virus transmission. Some vector-virus-host plant relationships.

Phytopathology, 1953, 43: 209-14, bibl. 25.

An account is given of experiments designed to determine the influence on *Brassica nigra* virus transmission of such factors as site of inoculation, effect of darkness and age on susceptibility to inoculation, effect of age on active virus concentration, and variation in transmission due to differences among virus sources.—Dep. Ent. Parasit., Univ. Calif., Berkeley.

4196. McCLEAN, A. P. D., AND COWIN, S. M.
Diseases of crucifers and other plants caused by cabbage black ring-spot virus.

Sci. Bull. Dep. Agric. S. Afr. 332, 1952, pp. 30, bibl. 12, illus.

The cabbage ring-spot virus causes a disease of cabbage and cauliflower, here described from South Africa for the first time, and also affects stock, turnip, Iceland poppy, shirley poppy, opium poppy, endive, lettuce and *Anchusa capensis*. The severity of the disease varies in the different hosts. Two species of aphid, *Brevicoryne brassicae* and *Myzus persicae*, are vectors of the virus.

4197. KÖHLER, H.

Innetherapeutische Wirkung der Antibiotica. (The therapeutic action of antibiotics.)

Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 155-9, bibl. 9.

Experiments were carried out to study *in vivo* the action of diluted filtrates from *Penicillium* and *Streptomyces* cultures, which had proved antagonistic to certain pathogenic fungi when tested *in vitro*. *Alternaria circinans* of cauliflower was among the diseases included in the investigation. Cauliflower plants, grown in nutrient solution or sand culture, were inoculated with the fungus when the second pair of secondary leaves was formed. At the same time the antibiotic was added to the medium. After 6 days the controls were severely infected, while the plants treated with 5 and 10% concentrations of the filtrates remained healthy, except in the case of one out of the 5 compounds used. The results show that the antibiotics studied remain

active within the plant when absorbed by the roots.—Inst. f. Phytopathologie, Aschersleben.

4198. COLHOUN, J.

A study of the epidemiology of club-root disease of brassicae.

Ann. appl. Biol., 1953, 40: 262-83, bibl. 26.

The epidemiology of club root disease (*Plasmodiophora brassicae*) of brassicas was studied in indoor and outdoor pot experiments, cabbage seedlings being used. In both acid and alkaline soils a 70% soil moisture content provides favourable conditions for the incidence of the disease; in the former the optimum temperature is 18-23° C. and in the latter it appears to be over 23° C. In acid soils spore load does not influence incidence of attack under favourable conditions but under less favourable conditions it does. In alkaline soils, however, heavy attacks can only develop in the presence of a high spore load. In general, the conditions most favourable for incidence also favour development of the disease. No substantial difference in incidence in different soils was found. Results suggest that while liming in the field may control the disease if the spore load is low, even very heavy applications of lime may not be effective if the soil is heavily contaminated and soil moisture and temperature conditions are favourable.—Plant Path. Div., Minist. Agric., Queen's Univ., Belfast.

4199. ROTHAMSTED.

Clubroot of cruciferous plants.

A.R. Rothamsted exp. Stat. 1952, 1953, pp. 89-90.

The effect of various cropping treatments on the persistence of *Plasmodiophora brassicae* in soil was studied in box and pot experiments. Growing cabbage, ryegrass and poppies in infested soil reduced subsequent infection of susceptible plants. In one experiment the proportion of infected test plants was reduced from 57% after fallow to 28% after cabbage and to 19% after ryegrass, but it has not been possible always to repeat this result.

4200. ROHDE, G.

Kohlernie und Bor. (Clubroot and boron.)

Dtsch. Landw., 1952, 3: 642-6, bibl. numerous, illus., from abstr. in *NachrBl. dtsch.*

PflSchDienst, Berlin, 1953, 7: 36.

The root systems of plants infected with *Plasmodiophora brassicae* are shown to have great similarity to those of boron deficient plants. In spring 1951 kohlrabi seedlings were planted out in a frame containing soil infested with the clubroot organism. By the end of June the plants were badly affected by the disease and exhibited typical boron deficiency symptoms. Prior to a second planting early in July borax was applied to one-half of the frame at the rate of 20 kg./hectare. On 19 October 13.3% of the 45 plants on the treated plot showed clubroot infection as against 44.2% on the untreated plot. In field experiments, carried out on heavily infested soil in 1952 at the Agrobiologische Versuchsanstalt Blankenfelde, borax applications at the same rate reduced the percentage of diseased plants from 50 to 6.7. Photographs illustrated the improvement in root formation resulting from borax treatment. In the author's opinion *P. brassicae* infects only B deficient plants and is not the primary cause of clubroot. The

cultivation of legumes or clover and grass mixtures to increase available B in the soil is recommended as a natural means of controlling the trouble.

4201. ANON.

Black rot of cabbage and cauliflower.

Agric. Gaz. N.S.W., 1953, 64: 217-18.

Notes are given on black rot (*Xanthomonas campestris*) of cabbage and cauliflower and its control by seed steeping treatment, soil hygiene, crop rotation and the control of sucking and biting insects.

4202. OOSTENBRINK, M., AND DEN OUDEN, H.

Het koolcystenaaltje, *Heterodera cruciferae* Franklin, 1945, in Nederland. (*Heterodera cruciferae* Franklin in the Netherlands.) [English summary $\frac{1}{2}$ p.]

Tijdschr. PlZiekt., 1953, 59: 95-100, bibl. 4, illus.

Heterodera cruciferae has been found at 5 places in the Netherlands attacking cabbage, rape and swede. It does not attack beet, a fact which distinguishes it from *H. schachtii*. Morphologically it can be distinguished from *H. schachtii* and nearly all other *Heterodera* spp. by its small, red brown, roundish, lemon-shaped cysts and its short, thick larvae. In the cabbage growing district of Holland, *H. cruciferae* is a less important pest than *H. schachtii*.

4203. WRIGHT, D. W., AND WHEATLEY, G. A.

A comparison of the effectiveness of certain insecticides for the control of the cabbage aphid (*Brevicoryne brassicae* L.). *A.R. nat. Veg. Res. Stat. Wellesbourne for* 1952, 1953, pp. 19-27, bibl. 23.

HETP, BHC and parathion applied as foliage sprays and Pestox 3 applied to the soil and to the foliage were compared in their effectiveness against the cabbage aphid, raised on cabbage plants grown in the glasshouse. Both HETP and BHC gave high initial kills; HETP showed a short residual action and did not affect the aphid population for more than one day, whilst BHC showed a strong residual action for 3 days. Parathion gave a very high initial kill and had a good residual effect persisting on the outer leaves for 3 weeks. When Pestox 3 was sprayed onto the cabbage foliage it affected the aphids more rapidly than when it was applied to the soil. This difference disappeared after 5 days when, with both treatments, the aphid population simultaneously reached a zero level which was maintained for a further 9 days. During the next 2 months, the aphids in the hearts of the treated plants increased at a much slower rate than did those on the untreated series. On the outer leaves of treated plants they were unable to colonize for some 3 months. The possibility of toxic residues remaining in the harvested crop is noted. [From authors' summary.]

4204. MATTHEWMAN, W. G., AND HARCOURT, D. G.

Cabbage caterpillars in Canada.

Processed Publ. Canada Dep. Agric. Div. Ent. 97, 1953, pp. 7.

Notes are given on *Pieris rapae*, *Plutella maculipennis*, *Trichoplusia ni*, *Ceramica picta* and *Evergestis straminealis*, and on their control with DDT, rotenone, or pyrethrum dusts or sprays.

4205. DAVID, W. A. L., AND GARDINER, B. O. C. The systemic insecticidal action of sodium fluoroacetate and of three phosphorus compounds on the eggs and larvae of *Pieris brassicae* L.

Ann. appl. Biol., 1953, 40: 403-17, bibl. 9.

Four compounds, bisdimethylaminophosphonous anhydride (anhydride), bis(dimethylamino)fluorophosphine oxide (oxide), diethyl paranitrophenyl phosphate (E600) and sodium fluoroacetate (acetate), previously shown to have systemic insecticidal activity against aphids, have now been tested against the eggs and larvae of *Pieris brassicae* L. The anhydride proved to have little toxic action on *Pieris*, but the other three compounds showed both contact toxicity and systemic insecticidal action when taken up by the roots of cabbage plants from solutions and from soil. The acetate, but more especially the E600, also showed systemic action following application to the leaves. In all cases the order of decreasing toxicity was E600 > acetate > oxide > anhydride. E600 is the only compound which is outstandingly toxic to *Pieris* eggs and larvae. It has the added interest that when watered onto the roots of cabbage plants it kills larvae in egg batches on the leaves. Death takes place at the stage when the larvae are biting through the shells. The oxide and acetate proved to be surprisingly innocuous. [From authors' summary.]

4206. RIETHUS, H.

Anbau-und Lagerversuche mit Dauerweisskohl verschiedener Herkunft und Düngung. (The effect of origin and manuring on the storage of cabbage.)

Festschr. tech. Univ. Berlin-Charlott., Abt. Gartenb., 1953, pp. 73-86, bibl. 3.

Actual temperature and other conditions were found to be much more important factors in the storage life of cabbage than origin and fertilizer treatment. Nevertheless, losses were greatest from heavily manured fields, and it is recommended that cabbages from such fields should be given more air during storage. The most important change in chemical composition during storage was a considerable increase in amino acids.—Inst. f. Gemüsebau.

Celery.

(See also 4079.)

4207. JACKSON, H.

Some effects of maleic hydrazide on certain physiological responses of celery (*Apium graveolens*).

Diss. Abstr., 1953, 13: 147, Publ. 4696 of 114 pages.

Foliage sprays of maleic hydrazide favoured the development of seedstalk initials in Cornell 19 celery variety when applied at 50 and 100 p.p.m. to 13- to 16-week-old plants. Higher rates, 500 to 1,000 p.p.m., in contrast, inhibited seedstalk elongation in older plants. Exposure to low night temperature ($40 \pm 5^\circ$ F.) hastened the date and increased the percentage of seed stalk formation in young plants. Plants which were exposed to low night temperatures and low levels of soil nitrates before planting out generally had a greater physiological tolerance of comparable spray concentra-

tions. Notes are also given on storage tests with treated plants with respect to nitrogen and sugar contents.—Mich. St. Coll.

4208. STOREY, I. F., AND WILCOX, H. J.

Centrospora acerina on celery.

Plant Path., 1953, 2: 72, bibl. 1, illus.

This is the first record in Britain of *Centrospora acerina*, which causes a serious storage rot of celery in the U.S.A. and Canada [see H.A., 15: 2008]. The effects were most severe in crops left in the ground until the New Year, and it is considered that attack by some other fungus may have rendered the plants susceptible to attack by *Centrospora*.

4209. PERRY, V. G., AND SWANK, G., Jr.

Some celery seedbed diseases of central Florida and their control with certain chemicals.

From abstr. in *Phytopathology*, 1953, 43: 293.

A complex of nematodes (chiefly *Meloidogyne* spp., *Trichodorus* sp. and *Belonolaimus gracilis*) and fungi (chiefly *Rhizoctonia*, *Pythium* and *Fusarium*) causes considerable loss and stunting of celery seedlings in central Florida. In several experiments soil treatment with either methyl bromide (MC-2) or chlorobromopropene (CBP emulsible) prior to planting the celery seed has almost eliminated parasitic nematodes, parasitic fungi, and noxious weeds from seedbed areas. In all cases where either of the above materials was used, the survival and growth rate of the celery seedlings were more than twice that of untreated plots. Dichlorobutene, dibromobutene, D-D, EDB, and some other chemicals gave good control of either nematodes or fungi but were not effective against both.

Cucurbits.

(See also 4096c, 4229, 4327f, n, x.)

4210. RAJASEKHARA MUDALIAR, C.

Studies in the nomenclature of South Indian cucurbits (*Cucurbita* spp.).

S. Indian Hort., 1953, 1: 13-24, bibl. 8, illus.

A key is presented for the identification of the 3 species of *Cucurbita* (*C. maxima*, *C. pepo* and *C. moschata*) cultivated in S. India. Morphological descriptions of 21 S. Indian types are given. Practically all the cultivated cucurbits of S. India are *C. moschata*.

4211. DAVIS, G. N.

Golden Pershaw [a new winter melon].

Calif. Agric., 1953, 7 (8): 13, illus.

The Golden Pershaw, a new winter melon released in 1952 by the University of California, originated from a chance hybrid. The plants are large and vigorous. The flesh of the golden yellow fruits resembles that of the Crenshaw melon, while the netting resembles that of the Persian melon.

4212. VENKATARAYAN, S. V., AND VENKATAKRISHNIAH, N. S.

New hosts of the downy mildew of cucurbits in India.

Curr. Sci., 1953, 22: 183-4.

Cucumis sativus and *Citrullus vulgaris* are reported for the first time in India and *Lagenaria vulgaris* for the first time anywhere (according to available literature)

as hosts of *Pseudoperonospora cubensis*.—Plant Path. Lab., Coll. Agric., Poona.

4213. CONNERS, I. L.

Powdery mildew on cucumbers under glass and its control.

FAO Plant Prot. Bull., 1953, 1: 106.

Experiments in Ontario have shown that powdery mildew (*Erysiphe cichoracearum*) on greenhouse cucumbers may be controlled by regular spraying either with $\frac{1}{2}$ -1 lb. Cu sulphate or 6-8 oz. dinitro capryl phenyl crotonate per 100 gal. water. Five sprays of the latter at intervals of 5-7 days completely eradicated the fungus. A nozzle-pressure of 150-200 lb. per sq. in. is desirable.

4214. PERSON, L. H., AND ELLIS, D. E.

Fruit rots of muskmelon in North Carolina caused by *Phytophthora* sp. and two sterile fungi.

From abstr. in *Phytopathology*, 1953, 43: 293.

In 1949 and 1950 fruit rots caused serious losses of muskmelons in the Ridgeway, North Carolina, area during excessively rainy periods just before and during harvest. The only external symptoms in the early stages of the disease were slight depressions of the rind. These were not readily discernible or constantly associated, so that extensive losses occurred in transit of fruit that was apparently sound when packed. Internal symptoms were of 2 types, a colourless rot of somewhat cheesy consistency and a rather firm, light to dark brown rot. Observations indicate that infection can occur through any portion of the rind whether or not in direct contact with the soil. These rots were no problem during the abnormally dry seasons of 1951 and 1952.

4215. SINGH, B., AND SINGH, K.

Fruit rot of cucurbits.

Sci. and Cult., 1953, 18: 489-91, bibl. 5, illus.

A *Pythium* sp., later identified as *P. aphanidermatum*, was isolated from diseased fruits of two *Luffa* spp., cucumber, *Trichosanthes anguina*, *Lagenaria vulgaris*, and *Momordica charantia*. In cross inoculation experiments isolates from any one of these hosts infected any other host, whether the fruits were previously wounded or not. Losses in *Luffa aegyptiaca*, the most susceptible of the 6 crops, were estimated to average 22% in the rainy season. The application to the soil of 1% Bordeaux mixture or of Cheshunt mixture effected some control, but under Indian conditions the use of "thatches", 2 ft. high, is recommended.—Govt agric. Coll., U.P.

4216. MICHELbacher, A. E., MIDDLEKAUFF, W. W., AND BACON, O. G.

Cucumber beetles. Insecticides tested for control on melons in northern California.

Calif. Agric., 1953, 7 (7): 7.

In northern California the western spotted cucumber beetle, *Diabrotica undecimpunctata*, and the western striped cucumber beetle, *Acalymma trivittata*, appear to prefer the honeydew variety of melon but they also find the crenshaw and casaba varieties attractive; net varieties seem to attract them least. Notes are given on

control with DDT, DDT plus sulphur, cryolite, parathion, dieldrin, aldrin and heptachlor.

4217. NARAYANAN, E. S.

The red pumpkin beetle and its control.

Indian Fmg., 1953, 3 (2): 8-9, illus.

Notes are given on *Aulacophora foveicollis*, a destructive pest of cucurbitaceous plants especially in the nursery, and its control by dusting with Paris green or lead arsenate. DDT or BHC are effective but phytotoxic.

4218. PHILLIPS, T. G., AND AVERILL, W.

Phosphorylase and a branching enzyme in squash.

Plant Physiol., 1953, 28: 287-92, bibl. 13, being *Sci. Contr. N.H. agric. Exp. Stat.* 153.

In a previous study [see *H.A.*, 17: 2697] of the changes occurring in winter squash during storage a large increase in sugar content was found to accompany the rapid disappearance of starch. As maltose was not found it was thought that phosphorylase might be active in the breakdown of starch. Squash fruits (*Cucurbita maxima*) were examined during 4 months of storage to determine the distribution of this enzyme. It was found to be abundant in the fibre connecting seeds with flesh. A branching enzyme was also present.

Legumes.

(See also 3746, 3749, 4327c, d, j, o, 4354, 4749.)

4219. WHYTE, R. O., NILSSON LEISSNER, G., AND TRUMBLE, H. C.

Legumes in agriculture.

FAO agric. Stud. 21, 1953, pp. 367, bibl. 126, illus., 15s.

This pamphlet consists of a review of the present state of scientific and practical knowledge and experience of the Leguminosae as vegetable, grain, forage, green manure and cover crops (including shade trees). It is primarily concerned with agriculture but the chapters on the following subjects are of horticultural interest: economic botany, ecological and biotic relationships, soil fertility, the tropics and subtropics, symbiotic N fixation, plant introduction and exploration, adaptation, strain variation and breeding, improved strains, seed production and notes on genera and species.

4220. SANTOS, I. M., AND XAVIER FILHO, S.

O feijão e sua cultura no Estado de Minas. (The French bean and its cultivation in the State of Minas Gerais, Brazil.)

Bol. Agric. Minas Gerais, 1952, 1 (1): 46-56, bibl. 3.

Notes are given on requirements, varieties, culture, harvesting, storage, pests and diseases, and calorific and nutrient value of the different varieties grown.

4221. MULLER, H. M., AND SELLSCHOP, J.

The sword or jack bean.

Fmg S. Afr., 1953, 28: 175, illus.

Brief notes are given on *Canavalia ensiformis* which is not a very popular crop in the Union of South Africa, as it requires a rather more tropical climate than that of most of the country.

4222. SELLSCHOP, J., AND MULLER, H. [M.].

The pigeon pea or dhal bean.

Fmg S. Afr., 1953, 28: 159-60, bibl. 2, illus.

General notes are given on *Cajanus cajan*, which in S. Africa does best in the warm lowveld and where frosts seldom occur.

4223. HERRMANN, —.

Buschbohnsortenversuch Marhof 1951/52. (Dwarf bean variety trials at Marhof, 1951/52.)

Saatgut-Wirtsch., 1953, 5: 175-7.

Data are given for 6 dwarf bean varieties on germination, percentage of diseased plants, yield (percentage early yield, yield per plant and per hectare) and the effect of irrigation, which produced a considerable increase in yield. One variety, St. Andreas, proved to be more drought resistant than the rest.

4224. SAYRE, C. B., TAPLEY, W. T., AND BARTON, D. W.

Variety comparison of peas used for canning and freezing, 1952.

Bull. N.Y. St. agric. Exp. Stat. 758, 1953, pp. 31.

Tabulated results are given of an extensive field experiment with 14 canning and 10 freezing varieties of pea grown in a replicated test in which blossoming dates, earliness of maturity, yields, pea sizes and tenderometer grades were determined. In addition 8 canning and 6 freezing varieties were included in a non-replicated trial. The most suitable varieties for canning were Surprise, Ace, Perfection and Shoshone; for freezing Thomas Laxton, Pluperfect, Perfected Freezer and Dark Seeded Perfection.

4225. WUNDERLICH, G.

Ertragsanalytische Untersuchungen an vier Erbsensorten bei verschiedener Bestandesdichte. (The effect of spacing on yields in four pea varieties.)

Bodenkultur, 1953, 7: 1-9, bibl. 3.

Four pea varieties were spaced at distances of 5, 10 and 15 cm. in the row, with a distance of 30 cm. between rows. Although all varieties yielded less with wider spacing, some were better able than others to make use of the available space by producing more shoots and hence more pods per plant, while the number of seeds per pod and the weight of 1,000 seeds remained unchanged. Varieties that will not compensate for losses due to bad germination or to birds by increased shoot production should, therefore, be sown more closely.

4226. MCCOLLUM, J. P.

Factors affecting cotyledonal cracking during the germination of beans (*Phaseolus vulgaris*).

Plant Physiol., 1953, 28: 267-74, bibl. 5, illus.

Varities of snap bean showed marked differences in susceptibility to cotyledonal cracking during germination. Susceptibility was associated with seed coat permeability and rapid imbibition of water. A rapid rate of water uptake apparently causes differential swelling in the cotyledons. Tensions arise that often result in transverse fissures. A high incidence of cracking may be expected when susceptible strains are planted in wet soils, especially at low temperatures.

The relative humidity at which bean seeds are held for a period before planting may affect their susceptibility to cotyledonal cracking during germination. The experiments suggest that some of the bean seed injury attributed by other investigators to mechanical causes may have occurred during germination. [From author's summary.]—Dep. Hort., Univ. Illinois, Urbana.

4227. QUANTZ, L.

Untersuchungen über ein samenübertragbares Mosaikvirus der Ackerbohne (*Vicia faba*). (Studies on a seed-transmissible mosaic virus of *Vicia faba*.) *Phytopath. Z.*, 1953, 20: 421-48, bibl. 36, illus.

The mosaic disease described is largely responsible for the virus infection of horse and broad beans in Germany. Its symptoms are a distinct mosaic pattern, leaf curl, stunted growth and wilting. The virus was shown to have a wide host range within the Leguminosae, but transmission to tobacco, cucumber and other test plants failed. All the 23 *Vicia faba* and 69 pea varieties examined, including the pea varieties Perfection and Surprise which are resistant to other viruses, were found to be susceptible. With broad beans seed transmission occurred in 2.8% of the plants, with horse beans in 1%. The vector has not yet been found. To distinguish it from the pea diseases causing mosaic in *Vicia faba* the name proposed for the new virus is *Viciavirus varians* n.sp.—Inst. f. Virusforsch., biol. Bundesanst. Celle.

4228. KLINKOWSKI, M., AND BEHR, L.

Die "Schwarzbeinigkeit" der Phaseolus-Arten. ("Black leg" in *Phaseolus* spp.) *Phytopath. Z.*, 1953, 20: 405-20, bibl. 21, illus.

(1) In 1948 runner and, in some instances, dwarf beans in central Germany were affected by a disease, the most conspicuous symptom of which was the onset of sudden, often complete wilting in the green-ripe stage. (2) The roots and the basal part of the hypocotyl showed a black discoloration ("black leg") which was associated with necrosis in the interior of the root, in the shoots and pods, and finally in the petioles. (3) Incidence of the disease was confined to certain varieties. If these varieties are used as parents in crosses, the progeny is liable to show susceptibility. (4) The micro-chemical examination of pods from diseased plants indicated that the necrotic reaction products are substitution or oxidation products of tannins. (5) The disease is seed-transmissible in a fairly high percentage of cases. (6) Transmission by pin pricks and grafting proved the virus nature of the disease. "Black leg" is to be regarded as a hypersensitive response to the common bean mosaic (*Marmor phaseoli*). (7) "Black leg" is identical with a disease described as "black root" in the U.S.A., where southern bean mosaic (*Marmor laesiofaciens*) also produced similar symptoms. [Translation of authors' summary.]—Martin Luther-Univ. Halle-Wittenberg.

4229. MISERA, J. N.

Ozonium wilt of guar and cucurbit plants in Bihar.

Nature, 1953, 172: 209-10, bibl. 1.

Guar (*Cyamopsis psoraloides*) is widely grown for fodder

in Bihar, but the green pods are used as a vegetable. In one area 20-25% of the plants were observed to die of a wilt, the causal pathogen of which was identified as *Ozonium taxanum* var. *parasiticum*. In several places the same fungus was found to cause wilting and subsequent death of *Cucurbita maxima* plants. In view of the long viability of the fungus in the soil, the disease threatens to become dangerous. Control measures are being investigated.—Bihar agric. Res. Inst., Sabour, Bhagalpur.

4230. DAVIS, A. C., AND SWENSON, K. G.

Evaluation of insecticides for pea insect control.

J. econ. Ent., 1953, 46: 321-3, bibl. 4, being *J. Pap. N.Y. St. agric. Exp. Stat.* 914.

For pea aphid, *Macrosiphum pisi*, control, parathion, malathion, metacide and systox were found very satisfactory; for pea weevil, *Bruchus pisorum*, parathion, malathion, DDT, aldrin and rotenone.

4231. WAY, M. J., SMITH, P., AND POTTER, C.

Control of bean aphid (*A. fabae* Scop.) on field beans.

A.R. Rothamsted exp. Stat. 1952, 1953, pp. 111-12.

Good aphid control and a large increase in bean yield were obtained from a single application of insecticide, especially of systox, parathion or nicotine. With the exception of nicotine, all the chemicals used were toxic to coccinellid predators.

4232. KISS, Á.

Növényenyésítés és a borsósziszik (*Bruchus pisorum* L.) elleni küzdelem. (Plant breeding and the control of pea weevil, *Bruchus pisorum*.) [English, Russian, French and German summaries.]

Növényterm., 1953, 2: 36-53, bibl. 28, illus.

In a summary of studies on pea weevil attack in Hungary it is stated that early ripening of peas does not reduce infestation and the weevil attacks not only young, tender pods but also older, well filled ones. At present there is no weevil-resistant variety, but experiments to develop one were initiated in 1950. The value of *Sigalphus thoracicus*, a naturally occurring parasite, as a means of biological control is under examination.

4233. DUNN, J. A., AND WRIGHT, D. W.

The control of pea leaf miners (Diptera. Agromyzidae).

A.R. nat. Veg. Res. Stat. Wellesbourne for 1952, 1953, pp. 14-18, bibl. 1, illus.

A field experiment in Lincolnshire in 1948 showed that a good control of pea leaf miners could be obtained with 0.25% DDT emulsion applied as in the control of the pea moth. Where two applications of the spray were made, the second four weeks after the first, the yield of dried peas was increased by more than 5½ cwt. per acre as compared with the control. Although DDT killed larvae of pea leaf miners when they were inside the leaves, better results followed when it was applied at the onset of attack and before extensive foliage-mining had occurred. In the 1949 experiments, a parathion spray gave a complete kill of larvae already in the foliage which suggested that this chemical might

be used, in preference to DDT, when the attack by pea leaf miners was well under way. [From authors' summary.]

Mushrooms.

(See also 4327e, 4748.)

4234. MUSHROOM RESEARCH ASSOCIATION LTD., YAXLEY.

Report of the Mushroom Research Station, Yaxley, Peterborough, for year 1952, 1953, pp. 50, 5s.

Casing soil (pp. 10-19, bibl. 9): The effect of soil pore space upon conditions in the soil and compost has been studied. In particular it is shown how watering reduces the soil pore space and consequently decreases the rate of diffusion of CO_2 through the soil. Thus CO_2 concentration in compost beneath a practically dry soil (pore space 50%) was about 0.2-0.4% and under a wet soil (pore space 10%) about 2%, or even 5% if the rate of CO_2 production was high. The effects of such concentrations and of changes in concentration on mushroom mycelium and fruiting are not known. *Cropping experiments on casing soil* (pp. 20-9): Data are presented on the effect of several experimental casing mixtures on yield, water holding capacity of the soil, etc. In an experiment designed to study the effect of delayed watering on fruiting it was found that the interval between first watering and appearance of pinheads was consistently just under 40 days, irrespective of how long the first watering was delayed. *General cropping experiments* (pp. 30-7): No striking results were obtained from experiments in which K and Mn were omitted in a synthetic compost, cut and uncut straw were compared and salt, urea and superphosphate sprays were applied. The effect on yield of stage of growth at picking was also investigated. *Microbiology* (pp. 38-46, bibl. 3): Preliminary trials are reported on eelworm control by nematocides and heat treatment (55° C. for 24 hours), on the effect of ultra-violet radiation on "bacterial pit" and mushroom development, and on truffle (*Pseudobalsamia microspora*) control, which was satisfactorily achieved by application to the compost of copper sulphate at 1% and 2%. Reference is made to *Mycogone*, *Verticillium*, and *verdigris* or mat disease (*Myceliophthora* spp.). Latest developments in the preparation of MRA synthetic compost are given in a supplement enclosed.

4235. BORZINI, G.

Funghi coltivati. (Cultivated fungi.)
Ital. agric., 1953, 90: 286-92, illus.

A description of the traditional technique of mushroom growing in cellars and caves is followed by short remarks on modern methods, in particular tray cultivation.

4236. EDWARDS, R. L.

New compost methods in three countries.
Grower, 1953, 40: 127.

Brief references are made to the synthetic composts of hay, corncobs and brewers' grains in various proportions used in America, the sawdust composts used in Germany, and an ambitious French research project on the composting process. Papers on these subjects were read at the recent International Conference on Mushroom Science at Gembloux.

4237. STOLLER, B. B.

A theory of composting based on the inverse yield-nitrogen law.

Bull. Mushroom Grs' Ass., 1953, No. 42, pp. 180-93, bibl. 20.

The author considers that the inverse yield-nitrogen law affords an explanation of the high mushroom yields recently obtained by 2 groups of American investigators: about 800 lb. per ton of manure with short composting in one case and over 500 lb. per ton with the use of very high initial temperatures in the other. In short composting the loss of dry weight of material is relatively small so that the ratio of carbonaceous material to nitrogenous material is higher than in long composting. The high C/N ratio is suggested as the basis of the operation of the inverse yield-N law. With more C available the yield of mushrooms is greater, but they contain less N. It is also suggested that in mushroom nutrition N requirement may vary inversely with K requirement so that as C dilutes N there is a greater K requirement which is supplied by the large amount of K in manures. To sum up, the high yields are explained on the basis of high C/N and high K/N ratios.

4238. SINDEN, J. W.

A theory of composting: observations.

Bull. Mushroom Grs' Ass., 1953, No. 43, pp. 221-3.

The author regards the evidence produced to support the inverse yield-N law in relation to mushrooms, as well as that to support the inverse N/K ratio [see preceding abstract], as too slender to provide an explanation of the high yields obtained by the 2 groups of investigators.

4239. EDWARDS, R. L., AND FLEGG, P. B.

Some artificial mixtures used in casing soil experiments.

Bull. Mushroom Grs' Ass., 1953, No. 42, pp. 205-7.

Experiments in progress at Yaxley Research Station aim at producing a completely artificial casing or the improvement of poor soils by fairly simple standard additions or both. A series of mixtures of the local clay loam subsoil, sand, sphagnum-peat and vermiculite is being employed. No relationship between the physical properties (moisture-holding capacity and wet and dry pore space) of the casing and cropping have yet been found. Peat-vermiculite and peat-sand, each in equal parts by volume, are the most promising mixtures and are worth trial by growers with poor soil. The vermiculite should not be less than $\frac{1}{4}$ in. mesh, the peat should be limed to bring the pH of the final mixture to about 7.5, and the mixture should be applied thoroughly wet. The casing should be not less than $1\frac{1}{4}$ in. deep. The cost is about 2d. per sq. ft. exclusive of mixing and application.

4240. ALEXANDER, T. M. W.

Mushrooms. Using peat as a casing medium.
Comm. Grower, 1953, No. 2998, pp. 1243-4, illus.

A rapidly increasing number of growers are now using peat, mixed only with lime and gypsum, as a casing material for mushroom beds. The cost is approximately the same as that of casing soil. Handling is easier, in

most cases increased crops are obtained and the incidence of disease is less. Peats vary enormously, however, in physical and chemical properties and it is of the utmost importance to use the right type and grade. Heavier crops are obtained from the dark, granular sedge types than from the softer moss types, although the latter can be used satisfactorily when mixed with vermiculite.

4241. U.S. DEPARTMENT OF AGRICULTURE.

Mushroom production.

Rep. agric. Exp. Stats U.S., 1952, 1953, p. 37.

At the Ohio Agricultural Experiment Station mushroom yields were increased up to 50% when vitamins were added to the beds. Additions of riboflavin, niacin, thiamine, and pantothenic acid resulted in each case in increased yields, but the greatest yield was produced by a combination of all four.

4242. GANDY, D. G.

Copper sulphate as a selective fungicide in compost.

Bull. Mushroom Grs' Ass., 1953, No. 43, pp. 225-6.

Laboratory experiments on the control of truffle in compost began in 1949. CuSO_4 is the only one of a large number of fungicidal or fungistatic substances tested that has had the slightest effect; it has sometimes been completely successful and sometimes a failure. Tests on commercial farms have given equally variable results. The CuSO_4 is used at $\frac{1}{2}$ -1 lb. per ton of compost, dissolved in a suitable amount of water, and is sprayed or watered on at the last turn or just prior to filling. Five recent experiments by different growers are described.

Onions and related crops.

(See also 3898, 4079, 4327w, 4749.)

4243. MILLÁN, R.

Las hortalizas del género *Allium*. (Vegetables of the genus *Allium*.)

Darwiniana, 1952, 10: 90-111, illus.

An account of the morphological characters of the genus is followed by an identification key and botanical notes on 17 species or varieties.

4244. HAMASHIMA, N.

On earliness of maturity in onion varieties.

[Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1953, 22: 33-40, bibl. 14, illus.

The effects of temperature, photoperiod and age of plant on bulb formation were studied in 11 Japanese and 10 American onion varieties, planted at Nagano (360 m.) in the autumn of 1951 and at Sugadaira (1,250 m.) in the spring of 1952. The results, which are summarized in some detail, showed that the factors controlling bulb formation are temperature and age in early varieties and day length and age in late varieties. If photoperiod and age of plant were insufficient for bulb formation in a particular variety, the tops remained erect. Long days and high temperatures, besides inducing bulb formation, also caused the tops to die down.

4245. BRISON, F. R.

Influence of storage conditions on the germination of onion seed.

Progr. Rep. Texas agric. Exp. Stat. 1492, 1952, pp. 4, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17660.

Yellow Bermuda onion seed stored in sealed containers remained viable longer than when stored in non-sealed containers; those with low moisture content remained viable longer than those stored with a high moisture content; and seed remained viable longer at a low temperature than at a relatively high temperature.

4246. PATERSON, D. R.

Some effects of foliar sprays of maleic hydrazide on the post-harvest physiology of potatoes, onions, and certain root crops.

Diss. Abstr., 1953, 13: 147-8, *Publ.* 4698 of 103 pages.

Sprays of 500, 1,000 and 2,500 p.p.m. of maleic hydrazide applied to onion foliage 7-10 days before harvest resulted in marked reduction of sprout and root growth during storage. Foliage sprays at 2,500 p.p.m. applied 3 weeks or more before harvest caused an increase in storage breakdown of onions. The effects of maleic hydrazide on the dry matter, total nitrogen and reducing and non-reducing sugar contents of stored onions, variety Y-40, are given. Foliar sprays of the chemical at 2,500 p.p.m. applied 10 days before harvest inhibited sprouting in carrots, beets, rutabagas and turnips. [See also H.A., 22: 659.]—Mich. St. Coll.

4247. ANON.

Diseases of onions.

Agric. Gaz. N.S.W., 1953, 64: 142-3, illus.

Notes are given on downy mildew (*Peronospora destructor*), smudge (*Colletotrichum circinans*), white rot (*Sclerotium cepivorum*) and bulb rots, and on their control by use of disease-free seed, crop rotation and sanitation, and proper curing of bulbs.

4248. BANHAM, F. L.

The effect of certain insecticides on the germination and growth of onions.

Proc. ent. Soc. Brit. Columbia, 1951, 48: 67-9, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17950.

Aldrin, chlordane, lindane, and DDT dusts, and Dowfume W-85 emulsion were incorporated into soil in pots to determine their effect on the emergence of onion seeds of the Yellow Globe Danvers variety and on the growth of the resulting plants. All the treatments except one produced more total plant material than the checks, but none was statistically better or worse than the untreated checks.

4249. FINLAYSON, D. G.

The effect of certain insecticides on the germination and growth of onions. II. Insecticides applied to the soil.

Proc. ent. Soc. Brit. Columbia, 1952, 48: 70-6, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17954.

The purpose of this investigation was to determine whether seed treatments to control onion maggot damage affected percentage and delay of germination, plant growth, and yield. DDT, BHC, aldrin, dieldrin, chlordane, toxaphene, and calomel were applied to the

seed in the form of a slurry, dry powder or an emulsion. Toxic symptoms were observed where onion seed was treated with BHC. Germination was reduced significantly when the onion seed was treated with wettable powder of DDT, BHC, dieldrin or toxaphene. Storage of chemically treated onion seed did not further reduce percentage germination but a delay in germination was evident.

4250. MATTHEWMAN, W. G., PERRON, J. P., AND CASS, L. M.
Varietal responses of seeded onions to the onion maggot.
Canad. Ent., 1953, 85: 253-4, bibl. 1.

Percentages of seedling onion plants of 9 varieties killed by the onion maggot, *Hylemyia antiqua*, in tests carried out in June and July, 1945-49, are tabulated. The data suggest that there are differences in resistance between certain varieties, but that on the average the differences are too slight to be significant with the low infestations that usually occur at Ottawa.—Field Crop Insect Labs, Ottawa.

4251. RICHARDSON, B. H.
Control of onion thrips in the Winter Garden area of Texas.
J. econ. Ent., 1953, 46: 92-5, bibl. 16.

Dusts of 5% heptachlor and 1.5% dieldrin were the most effective chlorinated hydrocarbons tested against onion thrips, *Thrips tabaci*. Applications of 2.5% aldrin, 20% toxaphene and 1% γ -BHC plus 5% DDT gave good commercial control. Of the phosphorus insecticides used 5% malathion, 1% metacide, 5% EPN and 1% parathion were satisfactory. In timing experiments with sprays, applications at 7-day intervals were found better than applications at 5-, 10- or 12-day intervals.

4252. GAUTHIER, M., AND RIBIÈRE, M.
L'ail d'Auvergne. (Garlic in Auvergne.)
Bull. tech. Inf., 1952, 69: 323-31, illus., from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 20501.

Notes on cultivation of garlic in Auvergne, and diseases and pests and their control. White common garlic and rose garlic are the main varieties.

4253. TIMS, E. C.
Chemical treatments of shallots for pink root control.
From abstr. in *Phytopathology*, 1953, 43: 294.

Puritized agricultural spray, $HgCl_2$, semesan, spergon, phygon, cersan and arasan were tested, usually with inconclusive results. In general, effective materials injured plants severely.

Root crops.

(See also 4079, 4246, 4278, 4327k.)

4254. RAVAUULT, L.
À propos de la culture du topinambour. (Culture of the Jerusalem artichoke.)
Bull. tech. Inf., 1952, 67: 161-8, illus., from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17672.

There are over 80 varieties of Jerusalem artichoke, some being cultivated mainly in mid-western France.

Cultural practices include a 1-year rotation, manuring, fertilizing chiefly with N and K_2O , planting the tubers 4-6 cm. deep, 30-50 cm. apart in rows 65-75 cm. apart, harrowing on emergence, machine digging, and disease control. Tubers are used raw or cooked, as distillery pulp, and as a cattle food. Culture is limited because of winter harvesting, difficulty of storing the tubers, and the dirtiness of the tubers grown in clay soils.

4255. WARNE, L. G. G.
Spacing experiments on vegetables. VIII. The responses of several varieties of globe beet, long beet and parsnips to changes in the thinning distance.
J. hort. Sci., 1953, 28: 152-9, bibl. 4.

Several varieties of globe beet, long beet and parsnip were grown at 5 spacings in randomized experiments conducted at Jodrell Bank Experimental Station in 1950 to determine their response to changes in thinning distance. The varieties differed in their yielding capacity and in their response (as measured by root weight) to changes in the space available for their growth. The physiological differences were not large enough substantially to affect the population range within which maximum yields of saleable roots were produced. In determining desirable populations for different varieties of these crops, morphological characters of the varieties have more effect than the physiological differences between them.—Bot. Dep., Vict. Univ. Manchester.

4256. LARSON, W. E., AND PIERRE, W. H.
Interaction of sodium and potassium on yield and cation composition of selected crops.
Soil Sci., 1953, 76: 51-64, bibl. 19, being *J. Pap. Ia agric. Exp. Stat. J.2266*.

Table beet and several field crops chosen for anticipated marked differences in reaction were used in greenhouse tests conducted at Iowa Agricultural Experiment Station to study the interaction of Na and K on yield and cation composition. Na and K were supplied as chlorides, alone and in combination, at rates equivalent to nil, 44 and 88 lb. and nil, 75 and 150 lb. per acre respectively. The results suggested that the crops which absorb the most Na with the least depression in K will respond best to Na fertilization. The K content of crops such as beet that absorb large amounts of Na cannot be considered as an index of yields. At low K soil levels the amounts of exchangeable K may not be a reliable index of the response to K fertilizers of crops that respond to Na only when K is limiting. Additions of Na to a soil will generally depress the uptake of K by plants. In some cases it may have no effect or may even slightly increase the uptake of K. Likewise, additions of K will generally depress Na uptake but may have no effect. The results will depend on the level of Na and K available to the plant and the relative ease of absorption of K and Na by the plant. Additions of either Na or K will usually depress the uptake of Ca and Mg, but the addition of one may have little effect if Ca and Mg have already been depressed by the other.

4257. KEYWORTH, W. G.
Silvering disease of red beet. A preliminary account.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1952, 1953, pp. 12-13, bibl. 1.

The first obvious symptoms of silvering, on seed crops of the Cheltenham Green Top variety of red beet, usually appear in April-May after bolting has started. At first a few leaves turn silvery-grey, then the discoloration spreads, all the leaves wilt and eventually the plant dies. The cause is at present unknown, but it seems most likely to be a virus.

4258. BANGA, O., AND KEULS, M.
Practijkproeven Berlikumer wortel 1949.
(Field trials with Berlikumer carrots, 1949.)
Meded. Inst. Vered. Tuinbouwgew. 47, 1953,
pp. 15, illus.

Tests are reported comparing the commercial value of 4 groups of Berlikumer carrots.

4259. BANGA, O., KEULS, M., AND WATTEL, M.
Practijkproeven met Flakkeese winterwortel, 1950-1951. (Field trials with Flakkeese carrots, 1950-1951.)
Meded. Inst. Vered. Tuinbouwgew. 49, 1953,
pp. 23, illus.

Flakkeese carrots are divided into 4 types, the market values of which are compared.

4260. NILSSON, F., AND FERNQVIST, I.
Fröodlingsförsök med morot. (Trials with carrots grown for seed.) [English summary 9 lines.]
Medd. Trädgårdsförs. Malmö 81, 1953,
pp. 12, bibl. 3.

Trials on carrot seed production were carried out from 1942 to 1948 at 4 localities in southern Sweden. Nitrogen was the only fertilizer that produced a significant increase in yield. The date of sowing (spring or summer) did not much affect the seed crop, but storage in clamps proved superior to leaving the roots unpulled in the field over the winter. At Alnarp, yields of sorted seed averaged 900-1,000 kg. per hectare from a total crop of 1,300 kg./ha.

4261. SMERTKIN, V. D.
Summer sowing of carrots. [Russian.]
Sad i Ogorod, 1953, No. 4, pp. 54-6.

Figures are presented showing that carrots and table beet, sown in summer produce better quality roots for consumption and also heavier yields of seed during the second year than plants sown early in the spring. For the Krasnodar province late May sowing of pre-germinated seed is recommended for maximum yields of carrot seed.

4262. LAMB, K. P.
Observations on yield and varietal susceptibility of some carrot varieties to insect attack in the field.
N.Z. J. Sci. Tech., Sect. A, 1953, 34: 531-7.

The results are discussed of 3 field trials in which yield and the incidence of *Cavariella aegopodii*, the carrot aphid, and *Psila rosae*, the carrot rust fly, were compared in 6 carrot varieties.—D.S.I.R., Auckland.

4263. BANGA, O.
Practijkproeven met Ronde Rode radijs 1951-1952. (Field trials with round red radish, 1951-1952.)
Meded. Inst. Vered. Tuinbouwgew. 44, 1953,
pp. 16.

The round, red varieties of radish are divided into 7 groups, namely: 1. Round Scarlet, Extra Shortleaf; 2. Round Scarlet; 2-3. Intermediate between 2 and 3; 3. Round Light Red; 4. Round Light Red Longleaf; 5. Scarlet Globe; and 6. Giant. Information is given on the characters of the various groups, including leaf/root ratio, susceptibility to woolliness and splitting, leaf length, root colour, root shape, homogeneity, and value as an open air and glasshouse crop.

4264. WINTER, E. J.
Irrigation experiments with radishes.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1952, 1953, pp. 32-40, bibl. 5, illus.

Two experiments were carried out in late summer and autumn 1952 to determine the effect upon radishes of the following irrigation treatments: Watering immediately after sowing, watering at weekly intervals during the growing period, and the above treatments combined. About $\frac{1}{2}$ -inch of water (rain plus irrigation) immediately after sowing was found to be sufficient for germination and establishment of all viable seeds. Not less than $\frac{1}{2}$ -inch of water weekly (rain plus irrigation) appeared to be necessary for maximum growth under the conditions of the experiment. No attempt was made to establish the optimum quantity of water for maximum crop. Irrigation tended to increase the number of small bulbs and quantity of leaves. A new precision rainer was used successfully in applying the irrigation water accurately and evenly to the experimental plots. [Author's summary.]

4265. CARLSON, M. C.
Root formation in isolated cotyledons of *Brassica napus* and *Raphanus sativus*.
Amer. J. Bot., 1953, 40: 233-8, bibl. 4, illus.

Isolated cotyledons of *Brassica napus* and *Raphanus sativus* produce adventitious roots from swellings at the ends of the midrib and lateral veins, when placed in culture dishes with water or nutrient solution. The swellings are produced partly by enlargement and divisions of the mesophyll cells but largely by enlargement and divisions of the parenchymatous cells scattered among the xylem and phloem cells of the veins. The roots originate as small groups of dividing cells on the surface of the mass of new tissue. They are distinguished from the other dividing cells of the region by their less vacuolated, and therefore more dense, cytoplasm and their larger nuclei and nucleoli. These are primordia which organize into root meristems and then emerge as roots through the cut surface. Sometimes several roots emerge consecutively from the same place, particularly from the midvein. No shoots were formed on the cotyledons in these cultures. [Author's summary.]—Northwestern University, Evanston, Ill.

4266. POUND, G. S., AND FOWLER, D. L.
Fusarium wilt of radish in Wisconsin.
Phytopathology, 1953, 43: 277-80, bibl. 7, illus.

A destructive *Fusarium* wilt of radish in Wisconsin is characterized by chlorosis, necrosis, leaf abscission, vascular discoloration of roots, stem and petioles, and suppression of root enlargement. All commercial radishes are susceptible with little varietal difference. The radish pathogen and the cabbage yellows pathogen

are compared. The authors list them as races 1 and 2 of *Fusarium oxysporum* f. *conglutinans*.—Dep. Plant path., Univ. Calif., Davis.

4267. MURPHY, E. F.

Vitamin C content of Maine rutabagas.

Bull. Me agric. Exp. Stat. 508, 1953, pp. 14, bibl. 25.

The vitamin C content of 10 varieties of freshly harvested rutabagas varied from 41 to 56 mg. per 100 g. Commercial fertilizer, farmyard manure, borax and lime had no influence on the vitamin C content.

4268. TIZIO, R.

Estudio preliminar del desarrollo fásico en nabo (*Brassica rapa* L.), variedad comercial medio largo de "Vertus" con relación a los factores que afectan la formación radicular carnosa. (Preliminary study of phasic development in the turnip variety Vertus in relation to factors affecting root formation.) [English summary ½ p.]

Rev. Fac. Agron. Eva Perón,* 1952, 28: 187-202, bibl. 14.

A study of the phasic development of the turnip variety Vertus in relation to factors affecting root development led to the following conclusions: (1) root thickening is independent of stem elongation and photoperiodism, but stops with flowering; (2) normal root thickening appears to require a period of heat or variation of temperature before flowering; (3) for stem elongation and flowering the plant requires a period of low temperatures followed by long photoperiods; (4) with early sowing in the open there is a time lag between the end of vernalization and the reaction to adequate photoperiods; (5) in greenhouse conditions high temperatures shorten the photoperiod necessary for flowering.

4269. JONES, R. W., AND HAMNER, K. C.

The intracellular distribution of ascorbic acid in turnip leaves.

Plant Physiol., 1953, 28: 314-16, bibl. 9.

Experiments designed to estimate the relative amounts of ascorbic acid associated with cytoplasm and the chloroplasts led to the conclusion that it is not present in the chloroplasts at an appreciably higher concentration than in the other portions of the cell, but they did not provide evidence as to whether it is excluded from the chloroplasts.—Div. Bot., Univ. Calif., Los Angeles.

4270. ROLAND, G.

Résultats d'une enquête sur la jaunisse du navet (*Brassica virus* 5). (Results of an investigation on turnip yellows (*Brassica virus* 5).)

Parasitica, 1953, 9: 54-8.

An investigation in 1952 in the Belgian provinces of Antwerp and E. and W. Flanders showed that the incidence of turnip yellows is lower in late sown than in earlier crops, as a result of a progressive decline in the population of infective aphids as the season advances.—Stat. phytopath. État, Gembloux.

* Formerly *Rev. Fac. Agron. La Plata*.

4271. STOKES, B. M.

The host plant range of the swede midge (*Contarinia nasturtii* Kieffer) with special reference to types of plant damage. [Dutch summary 1 p.]

LEEFMANS, S.

Enige notities naar aanleiding van het artikel van Miss Barbara Stokes. (Notes on the article by Miss Barbara Stokes.) [English summary 2 pp.]

Tijdschr. PLZiekt., 1953, 59: 82-90, bibl. 4, illus., and 91-4, resp.

An account is given of the various types of damage caused by the swede midge, showing that the type of gall is largely dependent on the stage of growth of the plant. A study of the host range of the midge in the Netherlands showed that it attacked a large number of crucifers including many brassicas. The possibility of a biological race of *C. nasturtii*, causing only "bell-flower" damage, is discussed.

The note by Dr. Leefmans points out the importance of this work in the study of the systematics of gall midges.

Salad crops.

(See also 4327i, m.)

4272. WEYDAHL, E.

Salat på Kvithamar. (Lettuce at Kvithamar.)

Gärtneryrket, 1953, 43: 248-50.

The results are tabulated of lettuce variety trials carried out at the Kvithamar Vegetable Research Station. The crop was grown in cold frames and hot beds heated by warm water and electricity.

4273. SHIBUTANI, S., ISODA, R., AND OKAMURA, T.

Ecology of lettuce in relation to growing season. [Japanese, with English summary ½ p.]

J. hort. Ass. Japan, 1953, 22: 41-4, bibl. 9.

Lettuce plants sown in late September or early October proved hardy in winter, while plants from earlier sowings were injured by the cold. At the beginning of December sugar content and osmotic pressure were generally highest in the inner leaves and in the less advanced plants from later sowings.

4274. EVENARI, M.

The germination of lettuce seeds. I. Light, temperature and coumarin as germination factors.

Palest. J. Bot. (J.), 1952, 5: 138-60, bibl. 24.

(1) Experiments were conducted with five varieties of lettuce seeds in order to determine how light, temperature and treatment with coumarin solutions interact in influencing germination. (2) With all varieties germination in complete darkness is a function of temperature within a certain temperature range. The lower the temperature, the higher is the germination percentage. This behaviour is termed "thermosensitivity". The temperature range, within which temperature is the limiting factor, is different for different varieties. (3) Coumarin depresses the germination of all varieties when germinated in complete darkness. This inhibition of germination is a function of the concentration of the coumarin and of the temperature. (4) The germination of all varieties is photosensitive. (5) The photosensitivity

is a function of temperature and of light intensity. Different varieties differ in their photosensitivity. (6) When the seeds are germinated in coumarin solutions under constant illumination, light either counteracts or intensifies the germination-inhibiting action of coumarin. This action is again a function of temperature and light intensity. (7) The weaker the light, the more pronounced is its stimulating influence upon germination. This is true only within certain limits of temperature and light intensity. (8) The influence of varying periods of illumination on germination was tested for 3 varieties. Under these conditions the germination percentage, besides depending on temperature and coumarin concentration, depends also on the duration of illumination. (9) The interaction of light, temperature and coumarin upon germination is explained by the change of thermosensitivity caused by light and treatment with coumarin. [From author's summary.]—Calif. Inst. Tech., Pasadena.

4275. POLJAKOFF-MAYBER, A.

Changes in metabolism of lettuce seeds during germination and its inhibition.

Palest. J. Bot. (J.), 1952, 5: 180-5, bibl. 8.

Besides the fat reserve, ripe lettuce seeds contain reserves of sucrose. Respiration in the initial stages of germination is due to sucrose oxidation and not to fat hydrolysis. Fat hydrolysis is accompanied by the formation of reducing sugar. A decrease in reducing sugar, observed when seeds were germinated in darkness, was accompanied by a slight increase in fat and a more pronounced sucrose accumulation. The energy used in germination, development and growth of the seedling is probably derived from sucrose oxidation. Coumarin blocks the hydrolysis of fats and the formation of the reducing sugars. [Author's summary.]

4276. DAVIDE, J. G., AND GALVEZ, N. L.

The effects of varying amounts of exchangeable bases on the yield and on the lime and phosphoric acid contents of lettuce.

Philipp. Agric., 1952, 35: 389-401, bibl. 11.

In replicated experiments at the Philippines College of Agriculture in 1949-51 two successive crops of lettuce were grown in soils with different amounts of exchangeable bases. Detailed results are given. The added cations, namely Ca^{++} , Mg^{++} , K^{+} and Na^{+} , were active growth-promoting factors. Although the second-crop plants weighed less than the first, their weights increased as the amount of exchangeable cations was increased. The removal of the cations and P by the first crop adversely affected the growth of the second-crop plants and their absorption of exchangeable bases and P.

4277. WESTERN, J. H.

Water balance failure leads to tipburn.

Grower, 1953, 39: 983.

Observations in the north of England have supported the view that nutritional factors are not primarily responsible for tipburn of lettuce. It occurs after a period when more water is lost through transpiration than can be replaced from the soil. This is likely to happen when soil temperatures are low, air temperatures high and there is bright sunshine. As the deeper-rooting varieties, such as 5B, suffer less from tipburn, the trouble may be overcome by breeding. Immediate precautions are adequate watering, and maintaining

high humidity and shading during periods of bright light.—Leeds University.

Spinach.

4278. LEGROS, N.

Épinard et succédanés. (Spinach and its substitutes.)

Bull. hort., Liège, 1953, 8: 169-71, illus.

Notes are given on spinach growing in the open and under glass. Recommended outdoor varieties are: for spring and summer sowing—d'Angleterre, Triomphe, Viking, Noble; for August-September sowing—Monstrueux de Viroflay, Roi de Danemark, Géant d'Hiver. Varieties recommended for sowing under glass are Monstrueux de Viroflay and Géant Cavallius. The cultivation of the following spinach substitutes for spring and summer sowing is described: New Zealand spinach (*Tetragonia expansa*), iceplant (*Mesembryanthemum crystallinum*), orach (*Atriplex hortensis*), *Beta vulgaris* var. *cicla*, and "tampala" which was introduced into Belgium in 1947.

4279. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.

Gibt es eine sogen. "Kaliruhr" nach Genuss mineralgedüngten Spinats? (Does spinach manured with mineral fertilizers cause a so-called "potash dysentery"?)

Wie wirken Frischhaltemittel (Biosmon) auf die wertgebenden Stoffe leichtverderblicher Blattgemüse (Spinat)? (What is the effect of dipping in mineral solutions on the valuable constituents of perishable leaf vegetables (spinach)?)

Ist das Feilhalten leicht verderblicher Erzeugnisse (Spinat) in Freiständen als qualitätsmindernd anzusehen? (Does the sale in open stands reduce the quality of perishable produce (spinach)?)

Bundesanst. Qualitätsforsch. pflanzt. Erzeugn., Geisenheim, 1951-53, pp. 12-13.

(1) Spinach manured with artificial fertilizers only did not have any unfavourable effect on children. The experiment was undertaken to test the correctness of statements made in some quarters. (2) Dips in mineral solutions, with calcium as the main constituent, are widely advertised for freshening up spinach, lettuce, and strawberries wilted in the market. Tests with spinach showed that the treatment restores the appearance of the product without affecting the considerable decomposition of vitamin C and protein. (3) Spinach kept in the shade under market conditions for 3½ days at temperatures of 17.0-31.5° C. and a relative humidity of 38-90% lost 78% of its initial vitamin C content.

Tomatoes, eggplants and capsicums.

(See also 3720, 3728, 3757, 4103, 4327b, g, h, q, r, 4368, 4757.)

4280. McCUE, G. A.

The history of the use of the tomato: an annotated bibliography.

Ann. Mo. bot. Gdn, 1952, 39: 289-348, bibl. 345.

The bibliography confines itself to the history and use of the tomato among peoples to whom it has been introduced, fully developed as a food plant, in comparatively recent times, and therefore omits Central and South America which "are, from all evidence, the home of the tomato, both wild and cultivated . . .". It is suggested that it came to the United States from the Levant via Italy and France.

4281. CARNCROSS, J. W. [Editor].
American Tomato Yearbook 1953.
Westfield, N.J., 1953, pp. 40, \$2.00.

The yearbook includes a key to tomato diseases, a list of references to tomato culture in the United States from 1948 onwards, and the statistics of tomato production in the U.S.A.

4282. QUEENSLAND DEPARTMENT OF AGRICULTURE,
HORTICULTURAL BRANCH.
Vegetable production. Tomato, cape gooseberry, eggplant and capsicums.
Qd agric. J., 1953, 76: 265-92, illus.

A treatise on most aspects and problems of tomato growing and harvesting in Queensland is followed by 5 pages in all devoted to cape gooseberry (*Physalis peruviana*), eggplant (*Solanum melongena*) and pepper (*Capsicum frutescens*). Diseases and pests are not discussed.

4283. LOCKIE, G. D.
Some cultural developments in glasshouse crops at Fernhurst.
Fernhurst Bull. 1, 1953, pp. 11, illus.

The bulletin gives an account of recent developments in the glasshouse section of the Fernhurst Research Station (Plant Protection Ltd.), where tomatoes are grown on a large scale. Observations are recorded and suggestions made under the following heads: Glasshouse construction, orientation and climate; soil preparation; tomato varieties; plant raising; artificial illumination; temperatures; humidity; light and heat; soil water; moisture measurement; nutrition; growing in raised beds; watering methods.

4284. AGATI, G.
Osservazioni sulla biologia della melanzana.
(Notes on the biology of the eggplant.)
[English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1953, 37: 63-70,
bibl. 15, illus.

Botanical classification, floral morphology and development, and compatibility.

4285. S., G.
Les piments. (*Capsicum annuum*.)
Courr. hort., 1953, 15: 203-4, bibl. 3.

Information is given on the varieties and culture of *Capsicum annuum* grown as a vegetable in the open and for ornament under glass.

4286. BOUHÉLIER, —, AND OTHERS.
Notes sur quelques caractéristiques des fruits de variétés de tomates nouvellement introduites. (Notes on the fruit characters of some recently introduced tomato varieties.)
Terre maroc., 1953, 27: 93-8.

Notes are given on fruit studies conducted by the

Horticultural Service in which 16 recently introduced, early, eating tomato varieties of English, French, German, Canadian and American origin were tested for abundance and redness of flesh, firmness and dry matter content, in comparison with four varieties in more or less general cultivation in Morocco. The following appeared to deserve further trial (especially the German varieties (2) and (4), which are both erect dwarfs and do not require tipping or staking): (1) Duffern's Seedling, (2) Heinemann's Jubiläum, (3) Money Maker, (4) Professor Rudloff, (5) Quebec No. 5, (6) Radio, (7) Single Cross, (8) Stonor's Exhibition, (9) Stonor's M.P., and (10) Valiant.

4287. HOLMBERG, D. M., AND MINGES, P. A.
Tomato culture. The case for field seeding.
West. Gr Shipper, 1952, 23 (11): 38-9,
from abstr. in *Biol. Abstr.*, Sect. D, 1953,
27, No. 17667.

Field seeding was first tried in Yolo County, Calif., in 1946. Half of the 25,000-acre 1951 canning tomato crop was field-seeded. Transplanted crops matured earlier and yielded slightly more than field-seeded crops in 1951. Some losses in field-seeded fields were caused by poor preparation, lack of surface moisture for germination, crusting of surface soil, weed competition, and damage caused by flea beetles, ground beetles, wireworms, and centipedes. With close spacing planting costs were lower in field-seeded fields and bacterial canker and tobacco mosaic were less prevalent. It is suggested that field seeding reduces the risk of introducing certain diseases and pests into clean fields. [See also *H.A.*, 22: 3892.]

4288. KONDRASHIN, S. S.
Raising tomatoes beyond the Urals by direct seeding. [Russian.]
Sad i Ogorod, 1953, No. 4, pp. 49-52, illus.

A method of raising direct seeded tomatoes in the Kurgan province (60-80 frost free days per annum) is described in detail, by which the same or higher yields can be produced within the short growing season as by the conventional method of plant raising. The system consists essentially of choosing best quality seed of suitable early varieties, pre-germinating the seed, sowing it on or around 15 May in well prepared ground, and giving 3 side dressings. It is shown that by careful selection of seed of the earliest fruits during 5 successive years the growing season was reduced by 26-34 days.

4289. VOSTROV, P. P.
Trial on vegetable cultivation without transplanting. [Russian.]
Sad i Ogorod, 1953, No. 3, pp. 33-6.

In the Krasnodar province, with 185-200 frost free days per annum, good results were obtained in 1951 and 1952 with direct seeded tomatoes. The fruit began to ripen 15-20 days later than on transplanted plants, but no reduction in yield was found. Early varieties were most suitable for cultivation without transplanting. Similar results were obtained with eggplant, pepper [*Capsicum*] and cabbage. All direct seeded plants appeared to be well adapted to their environment, and had a vigorous root system, and, possibly as a result of this, the incidence of stolbur disease and bacterial canker on tomatoes and bacterial blight on eggplants was reduced.

4290. ERVALJD, M. A.

The raising of sweet pepper and eggplant in the central zone of the U.S.S.R. [Russian.] *Sad i Ogorod*, 1953, No. 5, pp. 45-6.

In the Ryazan province [south of Moscow], germinated seed of sweet pepper was sown in April in frames, the young seedlings were given a 12 hr day treatment, were pricked out and spaced at 6×6 cm., and given 2 side dressings of superphosphate. When the danger of late frosts was over, 9-13 June, they were transplanted into the open and given 2 further side dressings of a complete mineral fertilizer. The plants were singularly free from disease and this resulted in yields comparable with those obtained under more favourable conditions in the south where diseases are prevalent. Harvesting began early in September and good quality fruit with a vitamin C content of 150-200 mg. % was obtained. Notes are given on the performance of 4 varieties. Eggplants were raised under similar conditions but were found to require higher temperatures.

4291. LEWIS, D.

Some factors affecting flower production in the tomato.

J. hort. Sci., 1953, 28: 207-19, bibl. 4.

There are three main factors affecting the size of the inflorescence in tomatoes: (1) a major gene; (2) a system of polygenes which is largely responsible for the differences in mean number of flowers in cultivated varieties; (3) the environment. The branching of the inflorescence is a variable character which is bound up physiologically with the number of flowers. But branching, whether it is due to environmental factors or variety, is the result and not the cause of increased flower production. Temperature and light are the most important environmental factors affecting inflorescence size. A low temperature (14° C.) during the growing period, from the expansion of the cotyledons to the appearance of the first inflorescence, causes an increase in flower production as compared with plants raised at 25°-30° C. In the variety Kondine Red the increase is twofold. Plants grown entirely under artificial light show a similar temperature effect to that shown by plants growing in natural light. High light intensity and/or day length increases flower production. Alternation of warm days and cool nights and vice versa, as opposed to a uniform temperature, had no effect on flower number in plants grown under natural light, but both had a depressing effect on flower production under artificial light. The sensitive period for the temperature effect on the first inflorescence is between the 8th and 12th day after cotyledon expansion. Treatments given from the time of cotyledon expansion to the emergence of the first inflorescence have an effect which sometimes lasts to the fifth inflorescence. [Author's summary.]—John Innes hort. Instn, Bayfordbury.

4292. MARRÉ, E., AND MURNEEK, A. E.

Carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of growth regulators.

Plant Physiol., 1953, 28: 255-66, bibl. 39, illus.

In the pollinated and fertilized ovaries of the tomato the first stages of development are accompanied by significant changes in carbohydrate metabolism. Two main aspects of these changes are recognizable:

(a) alterations in the equilibrium between the different carbohydrates, indicating modifications in the enzymatic pattern; (b) a marked increase in the capacity to absorb, retain, and concentrate carbohydrates. Application of the growth regulator, *p*-chlorophenoxyacetic acid or the ethyl ester of indoleacetic acid, to the cut surface of the styles of emasculated flowers produced effects strikingly similar to those induced by pollination and fertilization including starch synthesis, a decrease of sucrose, and an increase of reducing sugars. The degree of modification in carbohydrate metabolism in the unpollinated ovaries was in proportion to the concentration of the growth regulator applied. [From authors' summary.]—Dep. Hort., Univ. Missouri, Columbia.

4293. OSBORNE, D. J., AND WENT, F. W.

Climatic factors influencing parthenocarp and normal fruit-set in tomatoes.

Bot. Gaz., 1953, 114: 312-22, bibl. 14.

A study has been made of the influence of day and night temperatures, photoperiod, and light intensity upon the effectiveness of 2-naphthoxyacetic acid (2NA) for the setting of parthenocarpic fruit in the tomato, *Lycopersicon esculentum*. Results include a quantitative comparison of percentage set, yield, and average weight and size, for fruits from normally fertilized plants and from those sprayed with the growth substance. In general the conditions under which 2NA was most effective paralleled those under which the highest yields of normally fertilized fruits were obtained. At very high day or night temperatures induced sets tended to be lower than natural sets and at very low temperatures higher. Under all conditions 2NA prevented the abscission of sprayed blossoms, even when fruit formation did not occur. The average weights of spray-induced and normal fruits were not appreciably different. Spray-induced fruits, however, were generally larger at maturity and showed a tendency to hollowness, particularly when grown in low light intensity or short photoperiod. [From authors' summary.]—Earhart Plant Res. Lab., Calif. Inst. Tech., Pasadena.

4294. DENISEN, E. L.

Carotenoid content of tomato fruits as influenced by environment and variety. I. Effect of temperature and light.

Iowa St. Coll. J. Sci., 1951, 25: 549-64, from abstr. in *Turrialba*, 1952, 2: 184.

The green-ripe tomato variety Rutgers was grown in 12-hr temperature cycles of 15° and 35° C., 20° and 30° C., 15° and 25° C., and 25° and 30° C. The fruit ripened most rapidly with the cycle 20° and 30° C., the greatest quantity of lycopene was produced at 15° and 25° C., and fruit colour was palest at 25° and 35° C. Lycopene content varied greatly with the different light treatments. Covering the fruit with cellophane bags increased the lycopene content considerably, although there was no difference between the effect of coloured and colourless bags. Exclusion of light reduced the xanthophyll content of the leaves. Violet-coloured cellophane bags increased the yellow pigment of the leaves and orange bags decreased it, compared with uncoloured cellophane bags. Plants grown in darkness contained both lycopene and xanthophyll, although light was necessary for the maximum development of both pigments.

4295. DENISEN, E. L.

Carotenoid content of tomato fruit as influenced by environment and variety. II. Effect of plant nutrients, gas storage, and variety.

Iowa St. Coll. J. Sci., 1951, 25: 565-74, from abstr. in *Turrialba*, 1952, 2: 184-5.

In a factorial manual experiment with Rutgers, N was the only element that produced any marked increase in lycopene content. The greatest increase was obtained with a complete NPK application. In gas storage colour developed most rapidly at a temperature of 20° C. and an atmosphere containing 60% oxygen. Increase in O₂ content at a temperature of 35° C. caused a reduction in lycopene content but less so than at 20° C. The xanthophyll content of the leaves was less affected by temperature than was the lycopene content. Of the 12 varieties and hybrids tested Rutgers had the highest lycopene content. *L. pimpinellifolium* contained about 3 times as much as Rutgers and crosses between the two had a lycopene content that was a geometrical average between the two species.

4296. WHALEY, W. G.

The growth of reciprocal tomato-tobacco grafts.

Bull. Torrey bot. Cl., 1953, 80: 26-32, bibl. 10.

An account is given of studies conducted on growth and development in reciprocal tobacco-tomato grafts to determine stock-scion effects.—Univ. Texas, Austin.

4297. GLUŠČENKO, I. E., AND DROBKOV, A. A.

Introduction and distribution of radioactive elements in grafted plants and their effect on the development of tomato. [Russian.]

Izv. Akad. Nauk S.S.S.R. Ser. biol., 1952, No. 6, pp. 62-6, bibl. 5, illus.

Grafted plants of tomato on a *Solanum* sp. [unspecified] and *vice versa*, grown for 15 days in water culture containing radioactive phosphorus, P³², showed uneven distribution of phosphorus, the quantity being generally lower in the tomato, and concentrated in the upper parts of the stem. In *Solanum* the concentration was greater in the region of the graft union. When a radio-ultramicro element in a 1·10⁻⁹% concentration was injected into the scion or rootstock, it was translocated in either direction, but the distribution was again uneven. Small quantities of radioactive materials were observed to have a stimulating effect on tomato plants, particularly in the early stages of growth.

4298. HOFFMAN, I. C.

Effects of different amounts of soil moisture on growth and fruiting of greenhouse tomatoes.

Market Grs' J., 1953, 82 (5): 20-8, illus.

Over a period of several years spring and autumn crops of greenhouse tomatoes were given 7 different watering treatments, the amounts applied ranging from ½ in. to 2½ in. weekly. The smallest amounts of water produced the shortest plants with the smallest, darkest leaves, the smallest root systems and the lowest yields; the fruit was small and hard and 75% was unmarketable as a result of blossom end rot. The most favourable amount of water as regards vegetative growth and yield was 1½ in. weekly. Heavier applications were detri-

mental in early spring and late autumn. In the spring the best set of fruit was obtained with applications of less than 1½ in. Blossom end rot disappeared when weekly applications of 1½ in. water or more were given.

4299. BAUDET, —, AND OTHERS.

Compte-rendu d'un essai comparatif d'irrigation en pluie et par séguis d'une culture d'automne de tomates lisses. (Report on a comparative trial of sprinkler and furrow irrigation of an autumn crop of tomatoes.)

Fruits et Prim., 1953, 23: 111-14.

An account is given of an experiment conducted at the Station Régionale Horticole, Casablanca, to discover whether autumn export crops of tomatoes could satisfactorily be irrigated by the sprinkler method. Control plots received furrow irrigation. The variety employed was Gloire d'Alsace, the experimental design was a Latin square, each plot being 60 m. square, and the overhead rotary sprinklers had a range of 10 m. Sowing occurred on 12 July and planting out a month later. The percentages of take after planting out and of mortality during growth were not significantly different in the 2 methods. Yield was greater, but not significantly so, under furrow irrigation, and *Alternaria solani* attack was greater, but not significantly so, under sprinkler irrigation. The amount of water used in furrow irrigation was 3 times that used in spray irrigation. It was concluded that the sprinkler method is satisfactory for the crop concerned and is very economical in the use of water, but may favour fungal parasites.

4300. KARGAPOLOVA, N. N.

The effect of microelements on the yield of tomatoes. [Russian.]

Sad i Ogorod, 1953, No. 6, pp. 43-4.

Tomato plants raised from seed soaked twice for 24 hrs in 0·02% copper sulphate, 0·2% zinc sulphate or 0·02% boric acid produced higher yields of earlier ripening fruits than plants grown from untreated seed. Four applications of a 0·005% solution of the same materials to pricked out seedlings had similar effects. The application of copper to either seeds or seedlings was shown to have favourably influenced the progeny of treated tomatoes.

4301. U.S. DEPARTMENT OF AGRICULTURE.

Foliar fertilizer applications.

Rep. Agric. Exp. Stats U.S., 1952, 1953, pp. 36-7.

It is reported from Maryland that foliar fertilizer applications have effectively increased the yield of tomatoes when the fertilizers have been added to fungicide sprays to control premature defoliation. Increases up to 2·35 tons per acre have been realized where borax or borax plus magnesium sulphate have been added to the fungicide.

4302. AHMED, M. B., AND TWYMAN, E. S.

The relative toxicity of manganese and cobalt to the tomato plant.

J. exp. Bot., 1953, 4: 164-72, bibl. 12.

At equivalent concentrations, cobalt was more effective than manganese in inducing chlorosis and necrosis in tomato plants. Chlorotic plants suffering from either cobalt or manganese toxicity alone, or from the two conditions together, contained as much or more iron than normal plants, and chlorotic leaves responded

positively to painting with a solution of ferrous sulphate. When cultures were supplied with 5 p.p.m. Mn, distinct injury of the lower leaves occurred regardless of the cobalt supply, but the addition of cobalt up to 0.01 p.p.m. brought about a gradual increase in the chlorosis of the top leaves and an increase in dry weight. With cobalt at the 0.1 p.p.m. level, severe chlorosis and necrosis occurred and growth was stunted, but by raising the manganese level to 5 p.p.m. a substantial antidoting effect on the toxicity was obtained. Cobalt and manganese had an antidoting effect on each other, whereby at high manganese supplies small quantities of cobalt alleviated manganese toxicity, while toxic concentrations of cobalt were antidoted by high levels of manganese. [Authors' summary.]—Birmingham University.

4303. KIDSON, E. B., AND STANTON, D. J.
 "Cloud" or vascular browning in tomatoes.
 I. Conditions affecting the incidence of "cloud".

N.Z. J. Sci. Tech., Sect. A, 1953, 34: 521-30, bibl. 5, illus.

Cloud is a form of abnormal ripening which causes serious losses in unheated tomato houses in the Nelson district. Investigations at the Cawthron Institute, Nelson, suggest that it is a physiological disorder. It has been increased by soil sterilization, heavy watering, raw organic manures, glucose, heavy defoliation and excessive leaf growth, and decreased or eliminated by light watering, very heavy winter K dressings, and frequent application of N, KCl and CaCl₂ throughout the season.

4304. KIDSON, E. B., AND STANTON, D. J.
 "Cloud" or vascular browning in tomatoes.
 II. Some chemical characteristics of plant and soil in relation to susceptibility to "cloud".

N.Z. J. Sci. Tech., Sect. A, 1953, 35: 1-14, bibl. 2, illus.

Cloud [see preceding abstract] has been found to be associated with a low dry-matter content of the fruit and leaves. Treatments which increase cloud have been shown to decrease the dry-matter in the fruit and leaves and *vice versa*. The tentative conclusion is drawn that cloud is the result of an abnormally low content of organic matter in the fruit and may be due either to an excessive water uptake or to reduced photosynthesis under reduced light or to both these causes. It is suggested that the beneficial effect of heavy dressings of potash and nitrogenous fertilizers may be due to their effect on water uptake by the plant. Measures for the control of the disorder are suggested. [Authors' summary.]

4305. HUTTON, E. M., AND PEAK, A. R.
 Spotted-wilt development in resistant and susceptible *Lycopersicon* species.

Aust. J. agric. Res., 1953, 4: 160-7, bibl. 8, illus.

Lycopersicon pimpinellifolium (Porter's strain), *L. esculentum* variety Rey de los Tempranos and *L. peruvianum* exhibited different degrees of resistance to spotted-wilt virus, the first 2 being able to develop new growth free from virus. Resistance appeared to depend on the presence of a virus-inactivating system which

functions more actively when plants are kept at 90° F. Rey de los Tempranos appeared more promising than Porter's strain as a parent for resistant varieties.—C.S.I.R.O., Canberra.

4306. DOOLITTLE, S. P., AND ZAUMEYER, W. J.
 A pepper ringspot caused by strains of cucumber mosaic virus from pepper and alfalfa.

Phytopathology, 1953, 43: 333-7, bibl. 7, illus.

Peppers in Maryland, Delaware, and New Jersey and adjacent States are affected by a virus disease characterized by ring markings on the leaves and fruits. This disease is caused by a strain of cucumber mosaic virus or by a very closely related strain recovered from alfalfa leaves collected in Idaho.

4307. HARRISON, A. L.
 Seed treatments and soil drenches for the control of damping-off of tomatoes.

Abstr. in *Phytopathology*, 1953, 43: 291.

Orthocide 406 (50%), Carbide and Carbon Chemicals Company 5400, and Aagrano-350 constantly have given as good or better control of pre-emergence damping-off of tomatoes as N.I. cerasan, 2% cerasan, and cuprocide when used as seed protectants in soil artificially infested with oat cultures of *Pythium* sp. and *Rhizoctonia solani*. Some 25 different chemicals were used in these tests. Orthocide 406 and C.C.C. 5400 were used at rates ranging from 4 oz. to 24 oz. per 100 lb. of seed without signs of phytotoxicity. Aagrano 350 caused some injury at high dosage rates. The zinc salt of vancide 51 has, in preliminary tests, indicated that it also is a promising seed protectant for the control of pre-emergence damping-off of tomatoes. Orthocide 406 and C.C.C. 5400, as soil drenches just prior to seedling emergence, have helped reduce losses from post-emergence damping off. Under the same conditions fermate, as a soil drench, gave good control but caused some injury. In split plot tests with different seed protectants and soil drenches significant interactions have been obtained, indicating that some soil drenches can be used safely with some seed protectants but not with others. Fermate has, in some tests, caused significant reductions in stand with arasan treated seed, and vancide 51 significant reductions with both N.I. cerasan and cuprocide treated seed.

4308. GATTANI, M. L., AND KAUL, T. N.
 Damping off of tomato seedlings—its cause and control.

Indian Phytopath., 1951, 4: 156-61, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 221.

During July 1948, a severe attack of pre- and post-emergence damping-off occurred in nursery tomato plots at the Imperial Agricultural Research Institute, New Delhi. The causal organism was *Pythium aphanidermatum*. Dusting tomato seeds with cuprous oxide, copper sulphate (both at 1½ oz. per lb. seed), or cerasan (0.2 oz. per lb. seed), or soaking in 10% copper sulphate solution reduced the incidence of damping-off by 10, 11, 13, and 29% respectively. Soil disinfection with formaldehyde reduced it by 57% and, coupled with seed-soaking for one hour in 10% copper sulphate solution, by 63%.

4309. WAGGONER, P. E., AND SHAW, R. H.
Stem and root temperatures.
Phytopathology, 1953, 43: 317-18, bibl. 6,
being *J. Pap. la agric. Exp. Stat. J-2209*.
Measurements made on a clear August day showed
that temperatures in the stems of a corn plant and of
two tomato plants were lower than those at the
adjacent soil level. The relationship between these
findings and the susceptibility of certain vegetables to
damping-off is discussed, and it is concluded that the
temperature of the host may be more favourable to
Pythium ultimum than either air or soil temperatures
indicate.
4310. WAGGONER, P. E., AND DIMOND, A. E.
Role of chelation in causing and inhibiting
the toxicity of lycoramin.
Phytopathology, 1953, 43: 281-4, bibl. 9,
illus.
An account is given of studies from which it was
concluded that lycoramin does not play an important
role in the development of symptoms of fusarium
wilt of tomatoes.—Connecticut agric. Exp. Stat.,
New Haven.
4311. GÄUMANN, E., AND NAEF-ROTH, S.
Über den jahreszeitlichen Gang der Welke-
toxin-Empfindlichkeit der Tomatenpflanzen.
(On the seasonal cycle of sensitivity to the
wilting toxin in tomato plants.)
Phytopath. Z., 1953, 20: 449-58, bibl. 18.
Under uniform conditions in the glasshouse the
sensitivity of tomato plants to lycoramin was
found to vary with the season: in July it was three
times as high as in December. It is thought that these
fluctuations are related to differences in light absorption
and that they are controlled by a mechanism similar
to that regulating the seasonal fluctuations in the
ascorbic acid content of green plants.—Eidg. tech.
Hochschule, Zürich.
4312. LUDWIG, R. A.
Studies on the physiology of hadromycotic
wilting in the tomato plant.
Tech. Bull. McGill Univ. Montreal 20, 1952,
pp. 38, bibl. 29, illus.
It was found that wilting of tomato caused by *Fusarium*
oxysporum f. *lycopersici* could not be attributed to
increase in transpiration or reduction in water absorp-
tion, but appeared to result from an interference with
conduction. Examination of excised tomato stem
segments showed that the rate of flow of water therein
was governed by factors affecting rate of flow through
tubes and that the resistance was greater in diseased
plants than in healthy ones. A homogenous hyaline
material detected in the vessels of diseased plants
appeared to cause sufficient vessel obstruction to
account for wilting.
4313. NEWHOOK, F. J., AND DAVISON, R. M.
Combined hormone-fungicide sprays for
control of *Botrytis* fruit-rot in glasshouse
tomatoes.
Nature, 1953, 172: 351.
In recent years losses in glasshouse tomato crops caused
by *Botrytis cinerea* have become serious in New
Zealand, especially after treatment with fruit-setting
hormones where the dead petals are retained at the
calyx. In laboratory experiments and trials in com-
mercial glasshouses a high degree of protection was
obtained by the application at full bloom of a mixture
of β -naphthoxyacetic acid with ferbam, ziram and other
organic fungicides and by a repetition of the fungicidal
treatment 10-14 days later. Detailed results of the
investigation, which is being continued, will be pub-
lished elsewhere.—Fruit Res. Stat., D.S.I.R., Auckland,
N.Z.
4314. FELIX, E. L.
Susceptibility to tomato buckeye rot fungus
in Tennessee.
From abstr. in *Phytopathology*, 1953, 43:
290.
All tomato species so far tested are susceptible to
Phytophthora parasitica var. *terrestris*. Notes are given
on susceptibility in other plants.
4315. ABERDEEN, J. E. C.
Investigations on the phytotoxicity of
bordeaux mixture to tomatoes.
Qd J. agric. Sci., 1952, 9: 1-40, bibl. 29.
Experiments showed that 4-4-40 bordeaux mixture is
more toxic to tomatoes than 4-2-40 bordeaux and some
inert Cu sprays and dusts, the lime being an important
toxic factor. Season, cultural conditions and vigour at
the time of treatment influence phytotoxicity. Evidence
suggests that bordeaux stimulates tomatoes growing
on Cu-deficient soils and that it adversely affects
transpiration, photosynthesis and translocation and,
hence, flower setting.
4316. FRANKLIN, M. T.
Root-knot eelworm in tomato and scabious.
A.R. Rothamsted exp. Stat. 1952, 1953,
p. 93.
Meloidogyne incognita var. *acrita* has been identified as
the cause of severe galling of tomatoes under glass, and
M. hapla has been found damaging *Scabiosa caucasica*
growing out of doors in a Suffolk nursery.
4317. DEAN, J. L., AND STRUBLE, F. B.
Resistance and susceptibility to root-knot
nematodes in tomato and sweet potato.
From abstr. in *Phytopathology*, 1953, 43:
290.
Studies showed that the root systems of the resistant
tomato varieties tested were invaded by fewer larvae
(generally half the number or less) of *Meloidogyne*
incognita than those of the susceptible varieties tested.
Nematodes entering resistant roots produced extensive
necrosis of host tissue within 48 hours. Two weeks after
inoculation most of the invading larvae had died and
disappeared. No larvae in resistant roots ever developed
as far as the second moult.
4318. MOUTIA, L. A.
Considérations préliminaires sur le com-
plexe biologique de l'araignée rouge à
Maurice. (Preliminary notes on the bio-
logical complex of the red spider in Mauri-
tius.)
Rev. agric. Maurice, 1953, 32: 76-82, bibl. 3.
The incidence of *Tetranychus* sp., an important pest
of tomato and egg plant in Mauritius, is closely linked
with climatic factors and its recent increase is due to
the cultivation of these crops at unsuitable seasons in

certain localities. Notes are given on wild host plants and on local predatory insects, none of which is important. Of 2 ladybirds recently introduced one shows promise in the insectarium. For the control of red spider with sulphur insecticides at least 3 sprayings are desirable.

4319. MAGISTRETTI, G.

El gorgojo del tomate (*Phyrdenus muriceus* Germ.). (The tomato beetle, *Phyrdenus muriceus*.)

Bol. Ext. Univ. nac. Cuyo 1, 1952, pp. 4, illus.

A short account is given of the life history of *Phyrdenus muriceus*, a serious pest of Solanaceous vegetables in Cuyo Province, Argentina. Control in tomato crops is by dusting the soil round plants with BHC dust (5-20% active ingredient).

4320. MICHELBACHER, A. E., AND OTHERS.

Tomato insect investigations in Northern California in 1951.

J. econ. Ent., 1953, 46: 73-6.

Investigations conducted with dieldrin, aldrin, heptachlor and Q137 (an analogue of DDT) have shown that none of these insecticides is as effective as TDE against caterpillars (corn earworm, 2 species of armyworm and 2 species of hornworm) attacking tomato. Against the agromyzid leaf miner, *Liriomyza subpusilla*, however, dieldrin was the best, followed by aldrin and heptachlor.

4321. MICHELBACHER, A. E., BACON, O. G., AND UNDERHILL, J.

Leafminer on tomato.

Calif. Agric., 1953, 7 (7): 15.

1.5% dieldrin dust at 30 lb. per acre applied by aeroplane gave excellent control of *Liriomyza subpusilla* adults on tomato and a marked reduction of maggots, even though applied somewhat late. A dieldrin emulsion, however, at $\frac{1}{2}$ lb. in 10 gal. water per acre applied from the air did not give satisfactory control.

4322. MICHELBACHER, A. E., BACON, O. G., AND MIDDLEKAUFF, W. W.

Vinegar fly in tomato fields.

Calif. Agric., 1953, 7 (6): 10.

DDT and dieldrin show promise for the control of *Drosophila melanogaster*, but treatment recommendations cannot yet be made.

4323. ANON.

New low-cost tomato grader.

Comm. Grower, 1953, No. 3000, p. 1344, illus.

A new tomato grader intended for small growers is described and illustrated. It is specially constructed to save floor space and can be either hand or motor operated. Only 1 operator is required for a throughput of 2½-3 tons per 8 hrs. A new method of sorting is claimed. The price is £45 or, with a small electric motor, £55 10s.

4324. ARONOW, W. A., AND BRYAN, J. E.

Prepacking tomatoes.

Market. Res. Rep. U.S. Dep. Agric., Prod. and Market. Administ. 20, 1952, pp. 58, illus.

A critical survey of 14 tomato prepacking plants with suggestions for improvement.

4325. ANON.

Temperature control in tomato storage.

Grower, 1953, 40: 77, illus.

Advice is given on the technique of tomato storage, based on work conducted mainly at Ditton Laboratory, East Malling. At 53° F. ripening of tomatoes picked at the "turning stage" is delayed but proceeds normally. At storage below this temperature fruit must be ripened at 60-65° F. on removal from store. Fruit should not be stored below 45° F., the atmosphere should be moist, there must be free ventilation to prevent accumulation of CO₂, and fruit should be cooled to storage temperature as rapidly as possible.

Sundry crops.

4326. TARJAN, A. C.

Pathogenicity of some plant-parasitic nematodes from Florida soils. III. Growth of Chinese waterchestnut, *Eleocharis dulcis* (Burm. f.) Henschel, inoculated with *Dolichodorus heterocephalus* Cobb (Tylenchinae).

Proc. helminth. Soc. Wash., 1953, 20: 94-6, bibl. 4.

The awl nematode, *Dolichodorus heterocephalus*, was found among the soil micro-flora and -fauna associated with corms from diseased water-chestnut plants. In a greenhouse test plants inoculated with suspensions of the nematode showed reduced growth as compared with controls. It is concluded that, although symptoms of decline in some commercial plantings may not be due solely to the presence of the nematode, high populations of the nematode could result in serious damage.

Noted.

4327.

a ANON.

Climatic factors affecting vegetable culture in Trinidad.

J. agric. Soc. Trin. Tob., 1953, 53: 31-46, bibl. 4.

b ANON.

Paper "blankets" prolong tomato yield.

West. Gr Shipper, 1953, 24 (2): 29, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 17680.

As protection against autumn frosts and rain in California.

c BALLATORE, G. P.

Alcune varietà di fava. Caratteristiche morfologiche e manifestazioni biologiche. (The morphology and biology of some [Sicilian] varieties of broad bean.) *Ital. agric.*, 1953, 90: 267-78, illus.

d BAZZIGHIER, G.

Über mutmasslich induzierte Abwehrreaktionen bei *Phaseolus vulgaris* L. (On defensive reactions induced in *Phaseolus vulgaris*.) *Phytopath. Z.*, 1953, 20: 383-96, bibl. 9, illus.

Against *Botrytis cinerea*.

- e CASIMIR, J., AND TRZCINSKI, T.
Contribution à l'étude du métabolisme azoté dans les champignons. I. Répartition des acides aminés dans *Agaricus hortensis* var. *alba*. (The nitrogen metabolism of mushrooms. I. The distribution of amino acids in *Agaricus hortensis* var. *alba*.
Bull. Inst. agron. Gembloux, 1952, **20**: 178-84, bibl. 8.
- f DAVIS, G. N., WHITAKER, T. W., AND BOHN, G. W.
Production of muskmelons in California.
Circ. Calif. agric. Exp. Stat. **429**, 1953, pp. 39, bibl. 13, illus.
- g FIEDLER, J.
Výsledky pokusu s potomstvy roubovaných rajčat (Předběžné sdělení). (Results of trials with the progeny of grafted tomatoes. Preliminary communication.) [Russian and German summaries $\frac{1}{2}$ p. each.]
Sborn. čsl. Akad. Zeměd., 1952, **25**: 574-6. Complex tomato-potato grafts.
- h FINLAY, K. W.
Inheritance of spotted wilt resistance in the tomato. II. Five genes controlling spotted wilt resistance in four tomato types.
Aust. J. biol. Sci.,* 1953, **6**: 153-63, bibl. 9. For Part I see *H.A.*, 23: 845 l.
- i HEYWOOD, E. F.
Harvesting and marketing Maine lettuce.
Bull. Me agric. Exp. Stat. **510**, 1953, pp. 30, illus.
- j HOLLAND, A. H., AND OTHERS.
Production of green lima beans for freezing.
Circ. Calif. agric. Exp. Stat. **430**, 1953, pp. 22, illus.
Cultural practices, harvesting and economics.
- k IWAMA, S., AND HAMASHIMA, N.
Ecological studies on vegetables in regions of different altitudes. 3. Minowase, a summer variety of Japanese radish. [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1953, **22**: 15-23, bibl. 13.
- l MATSUMURA, T.
Seed production and degeneration of Hiko-shima-Haruna, a slow-bolting variety of Chinese cabbage. [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1953, **22**: 28-32, bibl. 5, illus.
- m MINISTRY OF AGRICULTURE, LONDON.
Lettuce aphids.
Adv. Leaflet. Minist. Agric. Lond. **392**, 1953, pp. 5, illus.
- n MOHR, H. C., AND CAIN, R. F.
Pickling cucumber variety trials at College Station, 1950-51.
Progr. Rep. Texas agric. Exp. Stat. **1514**, 1952, pp. 3, from abstr. in *Biol. Abstr.*, *Sect. D*, 1953, **27**, No. 17668.
- o NILSSON, F., ÅVALL, H., AND HINTZE, S.
Sortförsök med konservärter 1949-1952. (Variety trials with canning peas.) [English summary 1 p.]
Medd. Trädgårdsförs. Malmö **79**, 1953, pp. 32, bibl. 6, illus.
- p DE REZENDE-PINTO, M. C., AND BORGES, M. L. V.
L'action pathologique du virus de la mosaïque jaune du navet sur les chloroplastes de *Brassica chinensis* L. (The pathological effect of the turnip yellows mosaic virus on the chloroplasts of *Brassica chinensis*.)
Agron. lusit., 1952, **14**: 259-69, bibl. 21, illus.
- q SALTER, P. J.
Water-regimes in growing tomatoes.
Comm. Grower, 1953, No. 2998, pp. 1245-7, bibl. 6, illus.
See also *H.A.*, 23: 1947 and 3162.
- r SORENSEN, H. B., AND ALLEY, L. S.
Effect of different rates of nitrogen fertilizer on the shipping quality of greenwrap tomatoes.
Progr. Rep. Texas agric. Exp. Stat. **1522**, 1952, pp. 3, from abstr. in *Biol. Abstr.*, *Sect. D*, 1953, **27**, No. 20412.
- s TREBUCHET, G.
Orientation de la culture légumière en France. (The development of vegetable growing in France.)
Jardins Fr., 1953, **127**: 108-18, illus.
- t TURNER, N.
Development of resistance to rotenone by the Mexican bean beetle.
J. econ. Ent., 1953, **46**: 369-70, bibl. 8.
- u U.S. BUREAU OF ENTOMOLOGY AND PLANTATION QUARANTINE.
Cutworms in the garden. How to control them.
Home Gdn Bull. U.S. Dep. Agric. **29**, 1953, pp. 4, illus.
- v VALLE, G.
Alcune osservazioni su prove di germinazione del polline di ortaggi. (Some notes on germination tests on the pollen of vegetables.) [English summary 2 lines.]
Riv. Ortoflorofruttic. ital., 1953, **37**: 82-5, illus.
Pea, tomato, radish, cabbage, vegetable marrow, and *Plantago coronopus*.
- w VIENNOT-BOURGIN, G.
Sur la présence en France de *Botrytis squamosa*, parasite de l'oignon. (On the presence in France of *Botrytis squamosa*, parasitic on onion.)
Rev. Path. vég. Ent. agric. France, 1952, **31** (2): 82-98, illus., from abstr. in *Biol. Abstr.*, *Sect. D*, 1953, **27**, No. 17981.
- x DE WANDELER, C., AND CHALTIN, G.
Le melon! . . . un délice des gourmets. (The melon.)
Courr. hort., 1953, **15**: 205-7, illus., English version in *Grower*, 1953, **39**: 979-81, illus.
Raising the plants and culture in frames.

* Formerly *Aust. J. sci. Res., Ser. B. biol. Sci.*

TOBACCO.

General.

(See also 3714, 4296, 4743, 4748.)

4328. PATEL, M. S.

Cigar and cheroot industry in India.

Indian Tob. Quart., 1953, 3: 65-76, illus.

Notes on the important Indian cigar and cheroot industry and its problems, one of which is the lack of a good local wrapper tobacco. A list is given of the cigar and cheroot varieties grown in India.

4329. DUNCAN, R.

The history and present position of tobacco growing in England.

J. roy. Soc. Arts, 1952, 100: 316-28.

In a discussion of the cultivation and curing of tobacco in England the topics covered are soil, varieties (among those tried by the author in North Devon Haronova is best for cigarettes and Yellow Mammoth and Blue Pryor for pipe tobacco), sowing and planting, pests and diseases, topping, priming, harvesting, air-curing and bright-curing, fermentation, maturing and manufacture. [For a review of a book by the author on the same subject see *H.A.*, 23: 1372.]

4330. ISTITUTO SCIENTIFICO SPERIMENTALE PER I TABACCHI, ROMA.

Relazione tecnica anno 1952. (Annual report [of the Tobacco Scientific Experimental Institute, Rome] for 1952.)

Tabacco, 1953, 57: 135-53.

Agronomy section. Research projects at the Verona, Scafati and Lecce sections and at Rome are listed. These include varietal, yield and other trials, and studies on American and Levantine tobaccos, nursery soil management, green manuring, shading sub-tropical varieties, curing, soil fumigation, weeds, hail damage and root promoting substances. *Genetics and Physiology section.* Studies on genetics and on growth substances, cuttings, heliotropism, K foliar fertilization, control of *Cyperus rotundus* with herbicides. *Pathology section.* Studies on oidium control, various fungi and viruses, frenching, disease resistance of hybrids, K deficiency. *Entomology section.* Studies on *Lasioderma serricorne*, *Ephestia elutella*, insecticides, nematodes, virus vectors, stored tobacco disinfection. *Chemical section.* Studies in colorimetric determination of alkaloids and nicotine, biological function of nicotine and effect of length of growth cycle on nicotine, protein N, enzymes, water consumption, effects of various fertilizers and fermenting and curing systems. *Technological section.* Infra-red rays for determination of humidity in tobacco bales, fermentation and curing studies.

4331. GRIMALDI, A.

Su l'ordinamento colturale delle aziende Umbre coltivatrici di Bright. (On crop rotation for Umbrian farms growing [Virginia] Bright.)

Tabacco, 1953, 57: 171-82, illus.

Six different rotations incorporating tobacco are proposed. These range from a 10-year rotation to a 3-year rotation, each including one crop of Virginia Bright. A 2-year rotation is not advisable. When it is necessary to plant tobacco on a greater area than

the 3-year rotation allows for, it is perhaps best to divide the land into 4 parts and repeat the tobacco, thus: fallow, grain, tobacco, tobacco.—*Fac. Sci. Agrar.*, Perugia.

Breeding and varieties.

4332. STANKOVIĆ, I.

Korišćenje heterozisa za povećanje prinosa i poboljšanje kvaliteta naših duvana. (Heterosis as a means of increasing the yield and quality of tobacco.) [French summary 1 p.]

Arh. poljopr. Nauk, Belgrade, 1952, 5 (7): 153-69, bibl. 5, illus.

In trials at the Tobacco Institute, Prilep, with 2 local and 8 foreign tobacco varieties, 18 hybrids were produced. The hybrid seed germinated faster and the crop matured earlier producing 72% higher yields than the parent varieties. The quality of the hybrids was intermediate. Methods of obtaining hybrid seed are outlined.

4333. BOLSUNOV, I.

Erzeugung von ultra-ertragreichen Sorten als aktuelle Aufgabe der modernen Tabakzüchtung. (The production of higher yielding varieties as the aim of tobacco breeding.) *Fachl. Mitt. österr. Tabakregie*, 1952, Hft 1, pp. 6-16, bibl. 16, illus.

In view of the rising demand for tobacco and the progressive encroachment of tobacco plantations on land producing food crops, the production of higher yielding varieties has become an urgent problem. Reviewing his own breeding work and that of others the author discusses the lines to be pursued and expresses the view that great improvements are likely to be achieved in the not too distant future.

4334. LOLLICHON, F.

La production des tabacs de coupe au Cambodge. (Cigarette tobacco production in Cambodia.)

Arch. Rech. agron. Cambodge, Laos, Vietnam, 1952, No. 16, pp. 48+2.

Notes are given on the economics, technique and organization of cigarette tobacco production in Cambodia. The chief production areas are on river-bank alluvial soils, and on these Virginia Bright, Cabot de Bône, Hongrie (Muscatel) and Maryland (of Madagascar) do well. The study was the work of the Tobacco Division of the Scientific and Technical Research Centre of Indo-China; the Division was inaugurated in 1949 and closed in 1952.

Seed treatment.

4335. SEN GUPTA, J. C., AND PAIN, S. K.

Effect of time of sowing and pre-sowing cold treatment on the growth and development of tobacco plants (*Nicotiana tabacum* L. and *N. rustica* L.).

Bull. bot. Soc. Beng., 1949, 3 (2): 73-97, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17528.

Seeds of a flue-cured cigarette variety (Harrison Special, *N. tabacum*) and a hookah variety (Motihary, *N. rustica*) were sown at fortnightly intervals from 11 August to 10 October, 1945. In both varieties, the vegetative and reproductive growth, as reflected by number of fruits and heights attained, were best in the 10 September sowings; in Harrison Special, however, the leaf area was largest in the 10 October sowing. 10-25 September seemed to be the best sowing time for both the varieties under the conditions of the experiment. In addition, unsprouted soaked seeds, chilled at 2-4° C. in a refrigerator for 16 consecutive days and sown on 10 September along with the control, produced plants that were significantly late in budding, flowering and fruiting in the Motihary variety, whereas no such significant response either in vegetative or reproductive growth was produced in Harrison Special.

4336. OGDEN, W. B., AND FULTON, R. W.

Tobacco seedbed hints.

Circ. Wis. agric. Ext. Serv. **441**, 1953, pp. 19.

Practical hints are given under the following heads: location, fertilizers, seed treatment for weeds and diseases, frames and covers, seeding, disease prevention, watering, insects, nitrate solution, hardening plants, care during transplanting, summer care.

Composition.

(See also 4358c.)

4337. PHILLIPS, M., AND BACOT, A. M.

The chemical composition of certain grades of type II, American flue-cured tobacco.

J. Ass. off. agric. Chem. Wash., 1953, **36**: 504-24, bibl. 44.

It is shown that the quality within each group of the L colored grades appears to be directly related to the ratio of the percentage of reducing sugars to the sum of the percentages of oxalic and citric acids.

4338. BONAZZI, A.

Estudios sobre la fisiología del tabaco. VI. La topografía del nitrógeno en la hoja del tabaco rubio y su importancia. (Studies on tobacco physiology. VI. Nitrogen distribution in tobacco leaf and its importance.)

Rev. Fac. Ing. agron. Maracay, 1952, **1**: 103-13, bibl. 18.

Total organic N content in fresh and flue-cured tobacco leaves was investigated in 1951-52. It was found that the N content of basal leaves was lower than that of central and upper leaves (in the ratio 54: 100: 152), that there was a reduction in N content as maturity progressed (ranging from about 2% in yellow or yellow-green leaves to 5% in darkish green leaves), and that this reduction continued during flue-curing. The colour of a leaf on harvesting is a fairly accurate index of its N content and of the commercial grade for which it will qualify after curing. To improve N content topping should be carried out. Leaves harvested green ordinarily attain a higher grade than those harvested at a more mature stage.—*Dep. Quím. Suel., Fac. Ing. agron., Univ. centr., Venezuela.*

4339. BEINHART, E. G., AND OTHERS.

Nicotiana rustica. Distribution of nicotine in the plant, loss of nicotine during drying, and methods of analyses for nicotine and moisture.

[*Publ.*] *U.S. Dep. Agric. AIC-335*, 1953, pp. 30, bibl. 8, illus.

In this 3-season study, having developed a satisfactory technique for sampling and analysing the various parts of the plant for nicotine, it was found that no significant loss of nicotine or translocation from leaves to stalks took place during drying in an unheated barn. Oven-drying, however, produced evidence of a significant relationship between loss of nicotine and drying temperature. Pruning was shown to increase not only the total nicotine content but also the ratio of nicotine in the leaves to that in the rest of the plant. The leaves of a pruned plant contained 86% of the total nicotine, whereas those of an unpruned plant contained 69%.

4340. GHEZZI, G.

Nuovo metodo colorimetrico per la determinazione degli alcaloidi precipitabili dall'acido silicotungstico. (A new colorimetric method of determining alkaloids capable of precipitation by silicotungstic acid.) [English summary 1 p.]

Tabacco, 1953, **57**: 103-21, bibl. 18.

A description is given of the new method and of its application to the determination of nicotine. It is claimed that it is quicker than, and as accurate as, the gravimetric method.—*Lab. chem. Inst. Sci. sper. Tab., Lecce.*

4341. MCCLENDON, J. H.

The intracellular localization of enzymes in tobacco leaves. II. Cytochrome oxidase, catalase, and polyphenol oxidase.

Amer. J. Bot., 1953, **40**: 260-6, bibl. 34.

The presence of cytochrome oxidase in tobacco leaves was confirmed. In fractionally centrifuged sediments from leaf homogenates the distributions of chlorophyll and desoxypentose nucleic acids were found to be very different from that of cytochrome oxidase. It was concluded that this enzyme was mainly associated with the mitochondria or similar bodies known to be present in the leaves. Catalase and polyphenol oxidase were found to be present in all fractions in quantities roughly proportional to the protein content, and were not exclusively with the chloroplasts. Since this situation may be an artifact of the isolation medium (buffered M/2 sucrose), a possible reason is discussed. [Author's summary.]—University of Minnesota.

Fertilizers and nutrition.

(See also 3772b, 4159, 4358h.)

4342. KHEMCHANDANI, H. T., KADAM, B. S., AND KRISHNAN, A. S.

Nitrogenous fertilisation of cigar tobacco. *Indian Tob. Quart.*, 1953, **3**: 37-41, bibl. 5.

Experiments on the nitrogen manuring of cigar tobacco with four levels of nitrogen, 0, 30, 60 and 90 lb. per acre, three levels of farmyard manure, 10, 15 and 20 tons per acre, and different forms of nitrogenous manures, ammonium sulphate, groundnut cake and a combination of the two in equal proportions, were conducted at the Cigar and Cheroot Tobacco Research Station,

Vedasundur. Results of two years' work (1949-50 and 1950-51) indicated that the yield of cigar tobacco increases with higher amount of nitrogen. The highest yield was obtained with 90 lb. nitrogen per acre and the lowest when no nitrogen was applied, regardless of the farmyard manure application. There were no significant differences between different levels of farmyard manure nor was there any residual effect of the high application of farmyard manure. The effects of different forms of nitrogenous manures were also not significantly different. Physical appearance and smoking quality of tobacco fertilized with 90 lb. nitrogen was better than that with no nitrogen. Application of groundnut cake seemed to improve flavour and aroma of tobacco. Application of 90 lb. nitrogen as ammonium sulphate or groundnut cake or a combination of the two in equal proportion gave Rs. 188 to Rs. 220 more net returns per acre than the cultivators' practice of applying 20 tons of farmyard manure alone. [From authors' summary.]

4343. STEINBERG, R. A.

Symptoms of molybdenum deficiency in tobacco.

Plant Physiol., 1953, 28: 319-22, bibl. 6, illus.

Symptoms of Mo deficiency were induced in tobacco plants (Connecticut Broadleaf) in water cultures. They consisted of sallowing and mottling of the lamina in midleaves (about 24 days after treatment was started), generally with bending and twisting of the lamina, followed by the appearance of small interveinal necrotic areas that gradually merged until the whole leaf was withered. The symptoms gradually spread to other leaves until almost all became involved. The Mo deficiency achieved caused a week's delay in flowering, about 35% loss in dry weight and reduced upright growth.—*Plant Ind. Stat.*, Beltsville, Maryland.

Irrigation.

4344. LOVETT, W. J.

Water requirements of tobacco grown under irrigation at Clare, North Queensland.

Aust. J. agric. Res., 1953, 4: 168-76, bibl. 6.

An investigation was undertaken in 1948 and 1949 to determine the water requirements of irrigated dry-season crops of the flue-cured variety Kelly grown on sandy soil on the north Queensland coast (tropical climate, with April-December dry season during the whole of which irrigation is necessary). The total water applied varied from 8 to 27.5 acre-in. The best results were obtained with 1.0 to 1.5 acre-in. for plant establishment, followed by some 20 acre-in. during growth. Heavy applications retarded early growth and tended to reduce yield but not quality. With low rates of watering plants were stunted and failed to ripen satisfactorily, whereas high rates were above the optimum for yield and quality.

4345. TRAPPENBERG, R.

Untersuchungen über die mikroklimatischen Wirkungen künstlicher Beregnung im Tabakbestand. (Investigations on the effect of sprinkler irrigation on the microclimate in tobacco.)

Arch. Met. Geophys. Bioklim., 1952, 4B: 65-84, from abstrs in *Met. Abstr.*, 3: 1174, and *Soils and Ferts*, 1953, 16, No. 1028.

Results of observations with thermoelectric psychrometers at heights from ground level to over 1 m. are shown diagrammatically for shaded and unshaded plots. Sprinkling and shading increased humidity, especially long gentle sprinkling at 2 mm./hr on a summer morning; this produced a favourable soil micro-climate throughout the day.

4346. KADAM, B. S., AND OTHERS.

The influence of light irrigation on yield and quality of flue-cured tobacco.

Indian Tob. Quart., 1953, 3: 55-63.

Practically the entire crop of flue-cured tobacco in Andhra is grown in heavy black soil under dry conditions in the *rabi* [dry] season. The crop grows on stored moisture from the monsoon rains, and by the end of December moisture in the soil is considerably depleted to a depth of 12 in. Supplementary light irrigations at the appropriate time have revealed significant responses of the crop in yield of leaf, without any deterioration in quality. It was also found that under light irrigation the crop responds well to topping. Light irrigation makes possible efficient utilization of fertilizers when they are most needed by the crop and lessens deterioration of quality of leaf during unfavourable seasons. Development of various plant components, specially stems and roots, was significantly more in irrigated plots than in unirrigated ones, but the proportions remained unchanged when the plants were not topped. In topped plants there was a tendency for the proportion of stems to increase and that of leaves to decrease with waterings. [From authors' summary.]—*Centr. Tob. Res. Inst.*, Rajahmundry.

4347. AGLIBUT, A. P., AND TORREDA, R. V.

The influence of irrigation on the growth and yield of filler variety of Philippine tobacco.

Philipp. Agric., 1953, 35: 471-7, bibl. 4.

Irrigation water was applied in 4 different amounts ranging from 2.05 to 8.20 litres per plant, or the equivalent of 2.21 cm. per ha. to 8.82 cm. per ha., to 50 plants each of a filler variety of tobacco grown under uniform conditions of soil. Surface irrigation of 4.41 to 8.8 cm. per ha. produced better growth than that in the control and in the plants receiving less water. The highest yield of cured leaves was obtained when light irrigation was applied every two days or heavy irrigation every ten days. Heavy irrigation at longer intervals from the 3rd week to maturity produced wider and longer leaves than other treatments. The amount and frequency of irrigation did not influence the mortality of plants due to cutworms or stem borers. It was found that when small amounts of irrigation water were used better yield and size of leaves were obtained when intervals between applications were short. When heavier irrigation was given longer intervals between applications proved better.

4348. LIGUORI, O.

Alterazione non parassitaria su fusti di Bright Italia. (A non-parasitic stem defect in Bright Italia.) [English summary ½ p.]

Tabacco, 1953, 57: 183-202, bibl. 3, illus.

A stem defect in Bright Italia observed in the Lecce

district consisted of splitting of the cortex between adjacent leaves. It is ascribed to an excess of water absorption over transpiration due to an excess of moisture in a clay soil. When Bright Italia is grown in such conditions irrigation water should be applied in small quantities at short intervals, especially early in the life of the plants.—Inst. sci. sper. Tabacchi, Lecce.

Hail damage.

4349. GIANCANE, F.
Stima dei danni della grandine ai tabacchi levantini. (Assessing hail damage in Turkish tobacco.)

Tabacco, 1953, 57: 217-47, bibl. 6.

A description is given of a method of assessing hail damage in growing crops of Turkish tobacco. The percentage damage is calculated from equal numbers of plants of average development in sample plots 10-20 m. square and the percentage damage for the area is found by formulae. Types of injury include punctured lamina, broken leaf tip, and broken margin, midrib and secondary vein. The normal grading of the leaves of the varieties Xanthi Yaka and Erzegovina into 4 classes according to position on the plant and to quality in relation to site and the degrading for hail damage are given. The characteristic morphology and the method of cultivation of the 2 varieties mentioned and of Perustitza are briefly described.

Diseases.

(See also 4025, 4172, 4358a, b, f, g.)

4350. JONES, L. H.
Frenching—the tabu of tobacco men.
Res. Rev. Mass., 1953, 2 (2): 6-7, illus.

A combination of high soil moisture and a relatively high soil temperature is apparently necessary to activate the "frenching factor", a term provisionally used for the unknown cause of this disease. Liming the soil intensifies the symptoms. Drainage might provide some control.

4351. PUZZILLI, M.
Osservazioni sugli ibridi di prima generazione ottenuti tra le linee americane resistenti al mosaico e la linea Italia di Virginia Bright. (Notes on first generation hybrids between American strains resistant to mosaic and the Italian strain of Virginia Bright.)

Tabacco, 1953, 57: 207-16, bibl. 4, illus.

Notes are given on the behaviour of a number of hybrids bred last year with the aim of transferring resistance to mosaic from the American strains Kentucky 52, 56, 151 and 160 to Italian Virginia Bright without affecting the high leaf quality of the latter. The hybrids are phenotypically similar to the Italian Virginia Bright but their leaf cannot be flue-cured and they have therefore been crossed with Virginia Bright strain A No. 16. Only F_1 37, a ♀ Kentucky 52 × ♂ Italian strain hybrid, proved immune to mosaic.—Ist. Orto bot., Univ. Perugia.

4352. SAMUEL, C. K., AND SINGH, D.
Entomological investigations on the leaf-curl disease of tobacco in Northern India. VIII. Correlation between the heights of diseased tobacco plants and different types of viruses causing leaf-curl. IX. A study of the percentage of reduction in weights of leaf after curing in plants infected by different types of leaf-curl as compared with healthy ones. *Indian J. Ent.*, 1951, 13: 201-4, 205-8, from abstrs in *Biol. Abstr.*, Sect. D, 1953, 27, Nos. 18012 and 18013.

(1) The effect of viruses on 2 varieties of tobacco, Harrison Special and I.P. Hybrid-42, is to reduce the height of diseased plants appreciably in comparison with that of healthy ones. The plants affected by types A and B are about 84% shorter than healthy plants, and those affected by types C and D are 38% and 58% shorter, respectively.

(2) The percentage loss of weight during curing was greater in some plants affected by viruses, and in others less, than in healthy plants, but the differences were hardly significant.

4353. SCHLEGEL, D. E., GOLD, A. H., AND RAWLINS, T. E.
Suppressing effect of radioactive phosphorus on symptoms and virus content of mosaic tobacco plants. *Phytopathology*, 1953, 43: 206-9, bibl. 8, illus.

Radiophosphorus (P^{32}) in young mosaic tobacco leaves inhibited virus formation and mosaic symptom expression. P^{32} activity of around 100 counts per second per mg. fresh weight of leaf tissue decreased virus formation to approximately half that in control leaves; 200 counts per second decreased it to around $\frac{1}{2}$ that in controls. Levels of P^{32} of 200 or more counts visibly inhibited the terminal growth of stems and roots, but the enlargement of formed leaves was less susceptible to inhibition by P^{32} . [Authors' summary.]—Dep. Plant Path., Univ. Calif., Berkeley.

4354. HUMPHRIES, E. C., AND KASSANIS, B.
Effect of a dark period before inoculation on susceptibility of leaves to infection. *A.R. Rothamsted exp. Stat.* 1952, 1953, pp. 71-2.

When tobacco or French bean plants are kept in darkness, the soluble fraction of the nitrogen in the leaf lamina increases and nitrate accounts for most of the increase. On return to light the nitrate content falls. The numbers of local lesions produced by leaves of plants kept in light or darkness before inoculation with [unspecified] virus, or in leaves inoculated at successive intervals after the plants were transferred from darkness to light, were usually closely correlated with the nitrate content of the leaves at the time of inoculation. The results suggest that susceptibility to infection may depend on the concentration of simple soluble nitrogen compounds present in the leaf at the time of inoculation, and that the increased susceptibility caused by darkening the leaves before inoculation may be due to an increased concentration of nitrogen compounds suitable for synthesis of virus.

4355. MATTHEWS, R. E. F.

Factors affecting the production of local lesions by plant viruses. I. The effect of time of day of inoculation.

Ann. appl. Biol., 1953, 40: 377-83, bibl. 7.

Local-lesion counts have been widely used to estimate the relative amounts of virus in different preparations. In experiments with tobacco and other viruses in tobacco and other plants, however, the number of local lesions produced varied with the time of day at which inoculation took place. Such variations could affect the results of experiments with local-lesion counts.—Plant Dis. Div., D.S.I.R., Auckland, N.Z.

4356. HUTER, R., AND SAVARY, A.

La pourriture des racines du tabac.
(Tobacco root rot.)

Rev. romande Agric. Vitic., 1953, 9: 39-41, illus.

Thielaviopsis basicola causes serious losses to tobacco growers in French- and Italian-speaking Switzerland. Steam sterilization of seedbed soil was the only control measure tested that permitted the cultivation of susceptible varieties. The new resistant variety Mont-Calme Jaune Résistant has proved generally valuable, while a new White Burley variety is to be grown on a large scale in the Ticino. The problem of rotation crops is being studied.—Lausanne.

4357. ORELLANA, R. G.

Copper sulphate for the control of damping-off in tobacco seedbeds.

Phytopathology, 1953, 43: 125-7, bibl. 6, illus.

Damping-off of Virginia and Burley tobacco causes severe losses in seedbeds in Venezuela, particularly in the rainy season. Control of the disease was attempted by applying aqueous solutions of copper sulphate to the soil at the rates of 2, 20, 30, 50 and 100 g. per sq. m. of seedbed. The 2 g. rate was ineffective. The 20 g. rate gave only temporary control. The 30 g. rate checked the spread of the disease, but the 50 and 100 g. rates of copper sulphate excessively reduced seed germination and produced toxicity symptoms on seedlings. Transplants from the beds treated with 30 and 50 g. of copper sulphate developed normally, while those from the 100 g. treatments remained stunted. [Author's summary.]

4358.

Noted.

a APPLE, J. L., AND LUCAS, G. B.

Effectiveness of various field inoculation procedures in testing tobacco for black shank [*Phytophthora parasitica* var. *nicotianae*] resistance.

From abstr. in *Phytopathology*, 1953, 43: 289.

b BEST, R. J., AND GALLUS, H. P. C.

Some effects of mosaic virus on nitrogen and phosphorus metabolism in tobacco plants.

Nature, 1953, 172: 347, bibl. 3.

c BOOTHROYD, R. A.

The determination of the moisture content of leaf tobacco.

Indian Tob. Quart., 1953, 3: 77-9.

The standard method as defined by the U.K. Customs and Excise.

d IZARD, C.

Sur les tumeurs spontanées de certains hybrides interspécifiques de *Nicotiana*. (On spontaneous tumours in some inter-specific hybrids of *Nicotiana*.)

C.R. Acad. Agric. Fr., 1953, 39: 409-12.

e MOREIRA SANTOS, I.

Considerações gerais sobre o fumo e sua cultura. (General considerations on tobacco and its cultivation.)

Bol. Agric. Minas Gerais, 1952, 1 (6): 58-62.

Methods of improving tobacco yields in Minas Gerais, Brazil.

f OWEN, P. C.

Effect of infection with tobacco mosaic virus on the respiration of tobacco.

A.R. Rothamsted exp. Stat. 1952, 1953, p. 72.

g PRIE, N. W., AND BAWDEN, F. C.

The infectivity of tobacco necrosis virus.

A.R. Rothamsted exp. Stat. 1952, 1953, p. 77.

h ROSANOW, M., AND WYBENGA, J. M.

Cultivation and fertilisation of tobacco in Indonesia.

Indian Tob. Quart., 1953, 3: 25-35, bibl. 18.

i SZTEYN, K., BROUWER, H. M., AND PIEPERS, W. J.

Het gloeivermogen van sigarentabakken. (The glowing capacity of cigar tobaccos.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1953, 16: 414-26, bibl. 16, illus.

Methods of determination discussed.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(See also 4161, 4413a, c, f.)

4359. BARAT, H.

Étude sur le dépérissement des poivrières en Indochine. (Study of the decline of the pepper plantations in Indochina.)

Arch. Rech. agron. Cambodge, Laos, Viêt-nam 13, 1952, pp. 92, bibl. 118, illus.

A detailed account is given of research into a severe root disorder of black pepper (*Piper nigrum*) which results in decline, dieback and death. It made its appearance in 1941 and in 10 years had reduced the number of plants under cultivation by two-thirds. It is initiated by the nematode *Heterodera marioni* which enables the fungi *Pythium complexens* or *P. splendens* to enter the roots. Secondary parasites such as *Botryodiplodia theobromae* then intervene and rot invades the

stem. But the basic cause of the serious state of the pepper growing industry is a mosaic chlorosis, probably of virus origin, which makes the plants more susceptible to root rot. Most plants in production are already heavily attacked, although they may appear healthy and survive thanks to dry-season watering and to the application of soil which causes the formation of roots at new levels in the rains. Experiments designed to rehabilitate infected plantations showed that: the nematode population can rapidly be reduced by the application of a thick mulch (30 cm. thrice yearly); alteration of soil acidity and the application of bordeaux mixture to the soil have a slight favourable effect; excess soil moisture encourages rot; some rots arise at the sites of insect punctures. Long term control experiments are necessary.

4360. CHATTERJEE, B. N.

The cultivation of maghai pan at Gaya.

Allahabad Fmr., 26 (6), reprinted in *Punjab Fruit J.*, 1953, 25 (55): 19-20.

The high-quality maghai variety of *Piper betle* is cultivated only in the Gaya district. Notes are given on soil, rotation, preparation of land, sowing, irrigation, inter-cropping, culture, manuring, storage, diseases and pests.

4361. THEIS, T., AND JIMÉNEZ, F. A.

Vanilla pollen viability and foreign pollen influence.

A.R. P.R. fed. agric. Exp. Stat., 1952, pp. 16-17, from abstr. in *Trop. Abstr.*, 1953, 8, No. 1413.

Vanilla breeding is handicapped by the difference in date of flowering of the major species, *Vanilla pompona*, *V. phaeantha* and *V. planifolia*, but the pollen can be preserved in a desiccator for 2 weeks. The results of cross-pollination between these species are compared with those of self-pollination.

Drug plants.

(See also 4196, 4413d, f, 4748.)

4362. HODGE, W. H.

The drug aloes of commerce, with special reference to the Cape species.

Econ. Bot., 1953, 7: 99-129, bibl. 17, illus.

After a historical summary the taxonomy and ecology of *Aloe ferox*, *A. barbadensis* and *A. perryi* are described. Traditional and modern methods of drug extraction are outlined.

4363. NEUSS, N.

A new alkaloid from *Amianthium muscaetoxicum* Grey.

J. Amer. chem. Soc., 1953, 75: 2772-3, bibl. 4.

Amianthine, the name suggested for the new alkaloid, is closely related to the *Veratrum* alkaloids.

4364. KAPOOR, L. D., HANDA, K. L., AND CHOPRA, I. C.

Cultivation of *Atropa acuminata* Royle ex Lindley.

J. sci. industr. Res., India, 1952, 11A: 534-7, bibl. 5.

Atropa acuminata grows wild in the Western Himalayas from Kashmir to Simla at altitudes of 6,000-11,000 ft.

Attempts have now been made to cultivate the species, and methods of propagation (by seed, root division, cuttings), irrigation, weed control, harvesting and drying are described. The average annual yield per acre (dry weight) is given as 500 lb., 44% of which is stems and 56% leaves. In the first year the alkaloid content of the leaf was low, but the data tabulated for the second year after planting are encouraging. The cutworm, *Agrotis flammetra*, has been troublesome, but it was possible to avoid serious damage by transplanting in April-May, which allowed the roots to develop before the attack occurred.—Drug Res. Lab., Jammu-Tawi.

4365. GASTEV, N. S., AND PELEKHOVA, E. N.

The effect of light and nitrogen compounds on the alkaloid content of belladonna. [Russian.]

Agrobiologia, 1953, No. 1, pp. 94-5, from abstr. in *Soils and Ferts*, 1953, 16, No. 1590.

The alkaloid content was increased by sprinkling with solutions of NH_4 compounds, particularly $(\text{NH}_4)_2\text{CO}_3$, and decreased by sprinkling with $\text{Ca}(\text{NO}_3)_2$ solution.

4366. BOSHART, K.

Anbauversuche mit dem Schöllkraut, *Chelidonium majus*. (Cultural trials with *Chelidonium majus*.) [French summary $\frac{3}{4}$ p.]

Mat. veget., 1953, 1: 238-59, bibl. 12, illus.

Following the revival of pharmacological interest in *Chelidonium majus*, the author studied cultural methods and their effect on alkaloid content in the period 1937-40. He concluded from his results that the plant should be propagated by seed sown in rows 30 cm. apart. The leaves may be harvested in the first year and the roots in the autumn of the second year. Yields of dry roots amounted to 10-18 kg./hectare. Manuring which gave the best growth also gave the highest alkaloid content, highest yields being obtained from stable manure plus artificial fertilizers. Full data are tabulated.—Bayer. Landesanst. f. Pflanzenbau u. Pflanzenschutz, Munich.

4367. PLAUT, M., LACHOVER, D., AND COHEN-ASCOLI, B.

Experiments in chicory growing under Israel conditions.

Mat. veget., 1953, 1: 263-77, bibl. 17.

Yield and quality of chicory roots grown at Rehovot were found to be very satisfactory. Sowing in October proved preferable to sowing in spring. Best results in seed production were obtained from roots taken up 85-100 days after planting. From the fully tabulated data, which include analyses of roots and leaves, it is concluded that the prospects for chicory cultivation in Israel are promising, especially when the foliage is utilized as a cattle feed. The trials were carried out with 3 standard varieties.

4368. STRASZEWSKA, Z., AND MANIL, P.

Immunité conférée à *Datura stramonium* par une première inoculation de *Agrobacterium tumefaciens*; résultats négatifs sur tomate (*Lycopersicon esculentum*). (Immunity to *Agrobacterium tumefaciens* induced in *Datura stramonium* by inoculation; negative results with tomato.)

Bull. Inst. agron. Gembloux, 1952, 20: 387-90, bibl. 5, illus.

Datura stramonium plants with tumours resulting from inoculation with *Agrobacterium tumefaciens* showed partial to complete immunity to a second inoculation carried out 3-6 weeks after the first treatment, provided the pathogen was introduced close to a primary tumour (maximum distance 10 cm.). No immunity was induced in tomatoes.

4369. DUQUÉNOIS, P.

La culture des espèces de *Fagopyrum* (Tourn.) Gilib. comme matières premières de l'industrie pharmaceutique. (Growing *Fagopyrum* spp. as a source of rutin for the pharmaceutical industry.) [German summary 8 lines.]

Mat. veget., 1953, 1: 233-7, bibl. 6.

Rutin is obtained more cheaply from buckwheat, especially *Fagopyrum tataricum*, than by synthetic processes. At flowering time the leaves of this species contain about 2% of the chemical, yielding 20-25 kg./hectare. Higher yields may be expected from selected varieties and from the application of N fertilizers. Cultural practices, harvesting and extraction are described.

4370. CHAKRAVARTI, R. N., AND CHAKRAVARTI, S. C.

Alkaloids of *Glycosmis arborea* Correa. *Sci. and Cult.*, 1953, 18: 539-40, bibl. 5, illus.

Arborine (0.5%) and arborinine (0.07%) were isolated from the leaves of *Glycosmis arborea* which has sometimes been confused with *G. pentaphylla*.

4371. GUPTA, S. S. R.

Cultivation of *Hyoscyamus niger*. *For. Trade Indust.*, 1953, 6-7 (12/1): 102, 105, illus., from abstr. in *Trop. Abstr.*, 1953, 8, No. 1424.

Descriptive and cultural notes on *Hyoscyamus niger* which is grown only in one village in India.

4372. COUTINHO, M. C. P.

Notas sobre a constituição histó-anatómica das diversas espécies do género *Hypericum* L. existentes na serra do Gerês. (Notes on the anatomy of some *Hypericum* spp. found in the Gerês mountains.) [English summary 1½ p.]

Agron. lusit., 1950, 12: 517-49, bibl. 24, illus. [received 1953].

An account is given of the anatomy of 7 species of *Hypericum* found in the Gerês mountains in Portugal. These include *H. perforatum*, the source of "hypericum tea" which is taken for liver disorders.

4373. BISWAS, K.

Rauwolfia drug. *Sci. and Cult.*, 1953, 18: 579-81, illus.

Notes on *Rauwolfia serpentina* and *R. canescens*, which furnish the alkaloid rauwolfine from their roots and leaves respectively.—*Ind. bot. Gdn, Calcutta*.

4374. EDWARDS, M. G.

Pilot scale manufacture of hecogenin from sisal waste.

E. Afr. agric. J., 1952, 18: 21-3, bibl. 3, illus.

Hecogenin, a derivative of *Agave sisalana*, is a raw material for the synthesis of cortisone. The best source

of the saponin yielding hecogenin is the juice of the more mature leaves. The pilot manufacture scheme now in operation is described; it employs only the butt halves of the leaves since these contain fewer impurities. It utilizes the waste from the ordinary fibre extraction process which requires slight alterations but suffers no reduction in output or quality. The yield of crude hecogenin should be about 16 lb. per ton of fibre produced. [See also *H.A.*, 23: 902.]

Essential oils.

(See also 4413h, i.)

4375. SALGUES, R.

Sur quelques huiles essentielles nouvelles ou peu connues. (On some new or little known essential oils.) [English summary ½ p.]

Mat. veget., 1953, 1: 139-47.

The chemical and physical characteristics are given of 12 essential oils obtained from as many plant genera.

4376. SIEVERS, A. F.

Methods of extracting volatile oils from plant material and the production of such oils in the United States.

Tech. Bull. U.S. Dep. Agric. 16, revised 1952, pp. 28, bibl. 5, illus.

The oils discussed are those obtained from wild plants, from dill (*Anethum graveolens*), Japanese mint (*Mentha arvensis* var. *piperascens*), lemon grass (*Cymbopogon* spp.), tansy (*Kanacetum vulgare*), wormseed (*Chenopodium ambrosioides*) and wormwood (*Artemisia absinthium*); and from by-products of cedarwood, lemon and orange, apricot and bitter almond, and hop.

4377. SAMAN, J.

Essential oils from evergreen trees.

Amer. Perf. and ess. Oil Rev., 1952, 60: 19, from abstr. in *Econ. Bot.*, 1953, 7: 189-90.

The only 4 conifers of North America containing commercially valuable oils are: white cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), hemlock (*Tsuga canadensis*) and Canada balsam (*Abies balsamea*).

4378. STOLL, M.

La sauge sclarée, matière première servant à la préparation de produits à odeur ambrée. (Clary as a source of an ambergris substitute.) [English summary 6 lines.]

Mat. veget., 1953, 1: 135-8.

Sclareol, a crystalline substance obtained from *Salvia sclarea*, has a chemical composition very similar to that of ambergris and can be used as a substitute in the manufacture of perfumes.

4379. PENFOLD, A. R., AND MORRISON, F. R. Physiological forms of Australian essential oil-yielding flora.

Perfum. essent. Oil Rec., 1953, 44 (3): 80-2, 121, from abstr. in *Trop. Abstr.*, 1953, 8, No. 1347.

In 1927, the authors described three physiological forms of *Eucalyptus dives* trees, two of which contain piperitone and one of which contains cineole. The discovery of *E. dives* var. C opened up rich tracts for

commercial exploitation. The occurrence of physiological forms was also observed subsequently in the case of other important oil-yielding *Eucalyptus*, such as *Eucalyptus australiana*, *E. numerosa*, *E. micrantha*, *E. piperita* and, more recently, *E. citriodora*.

4380. PENFOLD, A. R., AND OTHERS.

The essential oil of a physiological form of *Eucalyptus citriodora* Hook.

J. Proc. roy. Soc., N.S.W., 1952, 85 (3): 120-2, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 17811.

Trees of this type, whose oils are predominately citronellol, grow in close association with more typical, citronellol-bearing forms. They are not distinguishable morphologically.

4381. SAMUEL, E.

Lavender oil from Tasmania.

New Commonw., 1953, 26: 86, illus.

The lavender oil industry was founded in Tasmania in 1922 when seeds from the French Alps were sown at Lilydale. Research has now reached a point at which relatively rapid expansion of output may safely be undertaken. The useful life of the plant has been extended from the accepted 7 years to over 25 years, annual yield has been raised considerably above the normal 16 lb. per acre, the scent and keeping quality of the oil have been improved, and better methods of cutting and processing the flowers have been evolved.

4382. HUGHES, A. D.

Improvements in the field distillation of peppermint oil.

Stat. Bull. Ore. agric. Exp. Stat. 525, 1952, pp. 60, bibl. 6, illus., being also *Bull. Ore. Engng Exp. Stat.* 31.

The results are given of the first 3 years' work in a co-operative research project on the field distillation of peppermint oil (*Mentha piperita*) inaugurated in 1949. Topics discussed are field distillation units, pilot plant design and construction, field tests in pilot plant, and study of the mint oil separation process. Recommendations are made for improvements in plant and technique.

4383. BAXTER, J. W., AND CUMMINS, G. B.

Physiologic specialization in *Puccinia menthae* Pers., and notes on epiphytology.

Phytopathology, 1953, 43: 178-80, bibl. 5, being *J. Pap. Purdue Univ. agric. Exp. Stat.* 650.

Deep autumn ploughing, elimination of exposed plant debris, and destruction of nearby wild or escaped hosts are suggested as possible measures for the control of mint rust.

4384. ANON.

Enige opmerkingen over de Ylang-Ylang en haar olie. (Some observations on ylang-ylang and its oil.)

Naarden Nieuws, April 1953, pp. 1-12, bibl., illus., from abstr. in *Trop. Abstr.*, 1953, 8, No. 1577.

The history and methods of cultivation of the ylang tree (*Cananga odorata*) for the production of essential oils is described. Ylang oil is obtained from the flowers of *C. odorata forma genuina*, and cananga oil from

forma macrophylla. The most important producing districts are Réunion, Nossi-bé (Comoro Archipelago) and Madagascar. The possibility of chemical refinement of the oil is discussed.

Fibres.

(See also 4374, 4413g, k, l, 4720.)

4385. TOBLER, F.

Rohstoff Bastfaser. (Bast fibres as a raw material.) [French summary 8 lines.]
Mat. veget., 1953, 1: 183-8, bibl. 5.

The term bast fibre is defined, and fibre treatment and utilization are discussed.

4386. ATEN, A., FAUNCE, A. D., AND RAY, L. R.
Equipment for the processing of long vegetable fibers.

FAO Develop. Pap. Agric. 26, 1953, pp. 57, bibl. 54, illus., 2s. 6d. or \$0.50.

This paper is intended primarily for agricultural leaders in the less well developed countries. It gives background information on and general descriptions of processing of a number of hard and soft fibres. These include abaca (*Musa textilis*), sisal (*Agave sisalana*), cantala or maguay (*Agave cantala*) chiefly grown in the Philippines and Indonesia, and ramie (*Boehmeria nivea*).

4387. REGEL, C., [AND TOBLER, F.].

Iris ensata—a fibre plant.

Mat. veget., 1953, 1: 310-11, bibl. 2.

Regel found *Iris ensata* plants growing in a botanic garden in Styria, Austria, and sent the leaves to Tobler for examination of their fibres. Tobler's report is not encouraging, but Regel believes that *I. ensata* has a future if selected and grown on poor soils unsuitable for other fibre plants.

4388. DOBELMANN, J.-P.

Avenir de la culture du kapokier dans la région de Marovoay. (The future of kapok cultivation in the Marovoay district [of Madagascar].)

Bull. Madagascar, Nov. 1952, pp. 64-71, from abstr. in *Agron. trop.*, 1953, 8: 215.

Notes are given on the cultivation of the white silk cotton tree (*Ceiba*) for the production of kapok on poor, degraded, unstable soils unfit for almost all crops in the Marovoay district of Madagascar. The climate is characterized by an annual rainfall of 1.5 m. in 4 months and a dry season lasting from May to November. Subjects covered are the raising of rootstocks from seed, budding, planting (7-15 m.), maintenance, yields and costs.

4389. LUNA ERCILLA, C. A.

El carao. Planta autóctona textil del continente americano. (*Neoglaziovia variegata*. A native fibre plant of the American continent.)

Bol. Prod. Foment. agric., 1952, 4 (32): 12-15, bibl. 9.

Neoglaziovia variegata is a xerophytic Bromeliaceous fibre plant that grows wild over large areas of the arid north-east districts of Brazil, where the average temperature is 26° C. and the average annual rainfall about 600 mm. About 8 million ha. are covered with *Neoglaziovia* in Brazil. Since 1933 the plant has been

exploited commercially on a large scale and extraction of the fibre has been mechanized. It is one of the most pliable of the hard fibres and is used as a substitute for jute. Chemical and physical characters of the fibre are tabulated and the possibility of cultivating the plant in Argentina is discussed.

4390. BOYCE, W. R., AND OTHERS.

Investigations into yellow-leaf disease of phormium.

N.Z. J. Sci. Tech., Sect. A, 1953, **34**, Suppl. 1, pp. 46, bibls., illus.

This is a collection of 5 papers, namely:

(1) Boyce, W. R., and Newhook, F. J., History and symptomatology (pp. 1-11, bibl. 18). (2) Strzemiński, K., Translocation disorders (pp. 12-16, bibl. 6). (3) Newhook, F. J., Anatomical aspects (pp. 17-30, bibl. 12). (4) Cumber, R. A., Experimental induction of yellow-leaf condition in *Phormium tenax* Forst, by the insect vector *Oliarus atkinsoni* Myers (Hem., Cixiidae) (pp. 31-40, bibl. 3). (5) Boyce, S. W., and others, Transmission experiments and discussion on control (pp. 41-6, bibl. 2).

Boyce summarizes as follows: "Yellow leaf disease of phormium (*Phormium tenax*) was first observed about 1908. During the following ten years many serious outbreaks of the disease occurred with the result that a number of phormium areas ceased production. The disease which infects both phormium and mountain phormium (*P. colensoi*) occurs throughout the North and South Island of New Zealand. In the North Island it is a limiting factor in economic production of phormium fibre. Since 1919 a number of workers have investigated the mycology, bacteriology and physiology of yellow-leaf infected plants but have been unable to demonstrate the cause of the disease. Recently it has been shown that phormium yellow-leaf is caused by a sap-transmissible virus which is spread in the field by the phormium hopper (*Oliarus atkinsoni*). Phormium yellow-leaf causes phloem necrosis and xylem gummosis leading to an almost complete blockage of translocation. Secondary symptoms are leaf yellowing, root and rhizome rotting, and finally, death of the plant. There is evidence that resistance occurs in at least one cultivar."

4391. PILETIĆ, A.

Mogućnost gajenja ramije u našoj zemlji. (The possibility of growing ramie in Jugoslavia.) [English summary $\frac{1}{2}$ p.] *Arh. poljopr. Nauk*, Belgrade, 1952, **5** (8): 157-62, bibl. 6.

In spite of very variable climatic conditions at Pančevo in 1950 and 1951, ramie, *Boehmeria nivea*, was successfully grown both years. The trial period was, however, too short to determine whether it can be grown economically.

4392. WALLACE, M. M., AND DIEKMAHNS, E. C.
Bole rot of sisal.

E. Afr. agric. J., 1952, **18**: 24-9, bibl. 8, illus.

Bole rot of sisal [*Agave sisalana*] is causing increasing concern in Tanganyika. In wet bole rot, the common type, infection almost invariably occurs through cut leaf bases. In basal dry rot uncut as well as cut plants are attacked and infection begins on the bole below

soil level. Experiments suggest that the 2 rots are manifestations of the same disease and are associated with the presence of *Aspergillus niger*, and that whether the rot is wet or dry depends on environmental and biochemical factors. Subsequent experiments showed that the severity of leaf cutting or site (upper or lower leaf base) of inoculation did not affect the degree of infection; spread was more rapid in wet weather. Control recommendations are: (1) where bole rot is prevalent confine cutting to the dry seasons; (2) cut out and destroy all rotting plants.—Plant Path. Lab., Lyamungu, and Sisal Res. Stat.

4393. WEBBER, J. M.

Yuccas of the southwest.

Agric. Monogr. U.S. Dep. Agric. **17**, 1953, pp. 97, bibl. 37, illus., 50 c.

A botanical study of the yuccas of south-western U.S.A. The chief uses of the yucca are for the production of fibre (for twine, burlap and rope), of juice (a base for liquid manures and an ingredient of oil fire extinguishers), and of saponin and other chemicals.

Hops.

(See also 4376.)

4394. ADVISORY SUB-COMMITTEE ON HOPS.

Institute of Brewing trials of the 1950 season's hops.

J. Inst. Brew., 1953, **59**: 306-12.

The Wye varieties John Ford Hop, Malling Midseason, Northern Brewer and Pride of Kent (1950 crop) were tested for suitability as copper hops and for dry hopping in eleven breweries. John Ford and Northern Brewer found the greatest acceptance for copper use. As regards dry hopping results were inconclusive, all varieties appearing suitable for some type of beer in the spring trials, but Malling Midseason apparently deteriorates on storage. [From author's summary.]

4395. MENERET, G., AND BONNAT, —.

Hops harvested in 1951. [French.]

Brasserie, 1952, **7**: 95-104, from abstr. in *Brit. Abstr. B. III*, 1953, p. 667.

This review deals with cultivation practices, botanical characters, chemical analyses, and the appearance, colour, and aroma of hops from Alsace, Burgundy, Lorraine, and northern France.

4396. DAVIES, J. W., AND HOWARD, G. A.

Evaluation of hops. II. Polarimetric determination of humulone.

J. Inst. Brew., 1953, **59**: 218-30.

A simple polarimetric method of determining humulone is described. Analyses of a large number of varieties of different ages are given and their bearing on hop deterioration in storage is briefly discussed.—Brew. Ind. Res. Found., Nutfield, Surrey.

4397. GOEDKOOP, W.

Further investigations of hop analysis.

J. Inst. Brew., 1953, **59**: 201-4, bibl. 6.

The Wöllmer method and the Ford-Tait method as modified by Gough give higher results for alpha-bitter acid in fresh hops than the Govaert-Verzele method, but after purification substantially no difference is found. Tabular comparisons of the alpha-bitter acid

content of many hop varieties by the 3 methods are given.—S. Holland Brewery, The Hague.

4398. KEYWORTH, W. G.

Verticillium wilt of the hop. VI. The relative roles of root and stem in the determination of wilt severity.

Ann. appl. Biol., 1953, 40: 344-61, bibl. 20, illus.

Grafting experiments with the susceptible Fuggle and the highly resistant OR 55 show that wilt (*Verticillium albo-atrum*) intensity in the stem is related to the variety of root, not of stem, and that this is not due to transfer of a "resistance factor" generated in the roots. The resistance of the Fuggle stem is governed by conditions relating to type of invasion and not to strain of pathogen. It is suggested that this also applies with root inoculations. Normal stems of both varieties have a high resistance to invasion from a weak source such as exists in a root of high resistance, and the fungus can invade the stems heavily only from a suitable inoculum source (i.e. a root of low resistance). The main conclusions that the primary focus of the disease is in the root and that the normal stems of all varieties possess a similar (and possibly high) resistance are supported by other investigations on wilt diseases and may be of general application.

Insecticidal plants.

(See also 4758.)

4399. HAGEMAN, R. H., PAGAN, C., AND LOUSTALOT, A. J.

The effect of elevation on growth, carbohydrates and insecticidal constituents of *Derris* and *Lonchocarpus*. [Spanish summary 15 lines.]

Turrialba, 1952, 2: 148-52, bibl. 5.

Two varieties of *Derris elliptica*, Sarawak Creeping and MG-clone 8, and one variety of *Lonchocarpus* sp. were grown in Puerto Rico for 2 years at 4 elevations ranging from 80 to 3,300 ft. above sea level. Sarawak Creeping was best adapted to the widest range of altitudes but it grew best at 1,200-2,400 ft. *Lonchocarpus* was the most exacting in its environmental requirements, the best growth being made at 1,200 ft.; even at this altitude, however, growth was not so good as that of *Derris*. MG-clone 8 made fair to excellent growth in the altitude range of 80-2,400 ft., the best growth being made at 1,200 ft. with little or no growth at 3,300 ft. The percentage of insecticidal constituents in the roots of all varieties decreased consistently, and the percentage of total carbohydrates in the roots increased, with altitude. MG-clone 8 had the highest percentage of insecticidal constituents at all locations. The percentage total chloroform extractives varied from 18.2 to 7.6 for MG-clone 8, from 11.0 to 1.0 for Sarawak Creeping, and from 15.3 to 3.4 for *Lonchocarpus*.

4400. EAST AFRICA HIGH COMMISSION (GLOVER, J., AND HARRISON, C. M. D.).

Pyrethrum "bud-disease" studies.

A.R. E. Afr. Agric. For. Res. Org., 1952, 1953, pp. 48-53.

Spraying trials. Experiments suggested that massive doses (200-400 gal./acre) of bordeaux mixture can control pyrethrum bud-disease (*Ramularia bellunensis*);

in a severe outbreak the disease rate was 2% or less in sprayed plants and 18% in unsprayed. Massive doses applied every 10 days throughout the year did not have a detrimental effect on bud production; to get efficient wetting it was necessary to add 0.4% liquid detergent to the spray. *Bud production in relation to climate.* Investigations showed that: (1) the total number of buds developing on a plant at any given time depends on the amount of chilling it received some weeks earlier; (2) cutting back does not alter the time of flush and so enable plants to escape bud-disease and it may cause yield loss if done too late in the year (i.e. towards the middle or at the end of the cold season); it may, however, be worth doing in order to facilitate picking or as a sanitary measure; (3) disease-bud production appears to be related to air humidity some 3-4 months earlier. *Intra-clonal variation* in disease-bud production appears largely to be due to variation in size of plant. Investigations show that the bigger the plant the more diseased buds it produces.

4401. RASPOPOV, I. M.

The effect of certain plant "phytoncides" on insects. [Russian.]

Priroda, 1953, 42 (4): 116, bibl. 1.

In the Caucasus "phytoncides", toxic volatile principles, extracted from 29 plant species (mainly woody) were tested for their toxicity to insects. Those obtained from tulip tree [*Liriodendron tulipifera*], mountain ash [*Sorbus* sp.], laurel cherry [*Prunus laurocerasus*], juniper, Douglas fir, camphor tree [*Laurus camphora*] and cypress were found toxic to flies and ants. In the Crimea the phytoncides of 10 species were tested but only that from *Salvia grandiflora* was toxic to insects. *Salvias* growing under unfavourable conditions, viz. exposed southern slopes, had considerably lower phytoncidal properties than those found in shady valleys.

Rubber plants.

(See also 4413j, m.)

4402. MIRŽINSKA, J.

Ogledi s kok-sagizom u Pomoravlju. (Research on kok-saghyz in Pomoravlje.)

[French summary ½ p.]

Arh. poljopr. Nauk., Belgrade, 1952, 5 (9): 131-43, bibl. 5.

From results of experiments conducted at the Agricultural Research Institute, Kruševac, from 1947 to 1950, it is concluded that under favourable climatic conditions it is possible to cultivate kok-saghyz in fertile soils. The optimum time for sowing was the beginning of March, and the best method of sowing was in groups of 100-150 seeds spaced 60×30 cm. apart. Yields of roots of over 50 m.³ per ha. containing upwards of 200 kg. latex were obtained.

4403. HÄRDTL, H.

Untersuchungen über die Pilzflora an *Taraxacum*-Arten. (Investigations on the fungus flora of *Taraxacum* spp.)

NachrBl. dtsh. PflSchDienst, Berlin, 1953, 7: 103-7, bibl. 37.

A review, partly based on the author's own observations, of the fungal and bacterial diseases of *Taraxacum officinale* and *T. kok-saghyz*.

4404. LANGE, W. H., Jr.

Aceria parthenii Keifer, a new eriophyid mite injurious to guayule.

J. econ. Ent., 1953, 46: 162-3, bibl. 1, illus.

In July 1952 in a Californian greenhouse the mite was observed to damage guayule, causing distortion of leaves not unlike 2,4-D injury or symptoms of a virus disease. The plants failed to branch properly and only a few weak flowers were produced. Among the materials tested sulphur dust applied 3 times at 3-day intervals gave the best control.

Seed oils.

4405. XABREGAS, J., AND TEIXEIRA, J. B.

Flora económica de Angola. I. Oleaginosas.

(Economic flora of Angola. I. Oil plants.)

[English summary 20 lines.]

Agron. angol., 1952, No. 6, pp. 103-14, bibl. 10, illus.

Notes are given on the trees *Moringa pterygosperma*, *Ricinodendron rautanenii*, and *Entandrophragma ekebergioides* and on their oils.

4406. CLAVIER, C.

Agrotechnie du ricin. (Agronomics of castor.)

Bull. Soc. Agric. Maroc., 1953, No. 47, reprinted in *Terre maroc.*, 1953, 27: 179-94, illus.

This paper consists chiefly of an account of the cultivation of and the first steps towards breeding castor (*Ricinus*) in Morocco. Soils, manuring, sowing (in February at 1×0.4 m. as an annual crop, or otherwise in April at 2.3×1.5 – 3.0 m.), maintenance and harvesting are discussed. Studies show that different cultivated forms exist in different parts of Morocco but none differs significantly from the subsontaneous wild one. Methods of breeding improved varieties are discussed.

4407. SCHOENLEBER, L. G., AND TAYLOR, W. E.

A two-row castor bean harvester.

Bull. Okla agric. Exp. Stat. B-395, 1953, pp. 11, illus.

Operating on the stripping principle, this machine has two rotating beaters which strip the beans into a screw conveyor and a slatted trash separator. The unhulled beans are conveyed into a trailing wagon, the trash being dropped onto the ground. At 40 in. spacing castor plants yielding 1,000 lb. per acre were harvested at a speed of 3-4 miles per hour.

4408. NORONHA, E. DE A.

Contribuição para o estudo da *Melampsora ricini* Passer. em Portugal. (Contribution to the study of *Melampsora ricini* in Portugal.) [English summary $\frac{3}{4}$ p.]

Agron. lusit., 1952, 14: 229-47, bibl. 33, illus.

Notes are given on castor bean rust, *Melampsora ricini*, under the following headings: bibliographical, geographical distribution, symptoms and conditions of infection, results of greenhouse inoculation experiments. The disease was found to be transmissible by

inoculation to all the varieties of *Ricinus communis* tested.—Dep. Fitopat., Estac. agron. nac., Sacavém.

4409. ABU-NASR, A. M., AND POTTS, W. M.

The analysis and characterization of the oil from the seed of *Citrullus colocynthis*.

J. Amer. Oil Chem. Soc., 1953, 30 (3): 118-20, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17529.

The seeds of *C. colocynthis* yield a linoleic-rich, semi-drying oil which has a light yellow colour and a faint agreeable odour. The mixed fatty acids consist of myristic, palmitic, stearic, myristoleic, palmoleic, oleic, and linoleic acids, the last 2 being major constituents. The seed contains about 18% of oil and acre yields are about 6,000 lb. of seed.

4410. MORA SADABA, F.

La oiticica, nueva semilla oleaginosa.

(Oiticica, a new oil seed.)

Bol. Oleic. int., 1953, No. 13, pp. 39-49.

Oiticica oil, the latest product placed on the world vegetable-oils market by Brazil, is similar to tung oil and is produced by the small Rosaceous tree *Licania rigida*. The fruits weigh about 3.5 g.; the seed comprises 65% of this and yields 60% of oil. The potential oil yield of Ceara, the chief producing province, is estimated at 95,000 tons p.a. The total Brazilian oiticica oil production in 1951 was 13,200 tons.

4411. TRUDDAIU, M.

Il lentisco in Sardegna e il suo olio. (The mastic tree in Sardinia and its oil.)

Olearia, 1952, 3: 296-7.

Notes are given on *Pistacia lentiscus* and its oil. The average yield of oil from the fruit is estimated as 15% and Sardinia's average annual fruit production as a million quintals. The refined oil has a pleasant taste and odour and resembles olive oil in some respects.

Tannins.

(See also 4413b.)

4412. DE ARRUDA VEIGA, A.

Nota preliminar sobre o espaçamento inicial da *Acacia mollissima* Willd. (Preliminary note on the spacing of *Acacia mollissima*.) [English summary 5 lines.] *Rev. Agric. Piracicaba*, 1953, 28: 99-106, bibl. 5.

A spacing trial with a randomized block design and 4 replications was conducted with wattle, *Acacia mollissima*, at the Batatais Forestry Garden in 1951-53. Spacings ranged from 1.0×1.0 m. by 0.5 m. intervals to 3.0×3.0 m. Two years after planting out, the trees at 2.0×2.0 m. showed the best height growth and the greatest diameters.

Noted.

4413.

a ABDUL SAMAD, A.

Ginger cultivation in Malabar.

Indian Fmg., 1953, 3 (3): 22-3, 25, illus.

- b BELAVSKY, E., AND TERMIGNONI, E.
Brazilian tannins.
J. Amer. Leather Chem. Ass., 1952, 47:
594-603, from abstr. in *Econ. Bot.*, 1953,
7: 189.
Eleven tannin plants are listed.
- c CHANDRASEKHARAN, S. N.
A little known spice plant *Zanthoxylum
rhetsa* DC.
Madras agric. J., 1952, 39: 563-4, from
abstr. in *Biol. Abstr., Sect. D*, 1953, 27,
No. 17806.
- d CHATTERJEE, A., AND MAJUMDAR, S. G.
Glycosin, the new alkaloid of *Glycosmis
pentaphylla*, Correa.
Sci. and Cult., 1953, 18: 505-6, bibl. 2.
- e FEURT, S. D., AND FOX, L. E.
A report on the waxy constituents of Spanish
moss, *Tillandsia usneoides* L.
Science, 1953, 117: 600-1, bibl. 5.
A possible source of a hard natural wax.
- f HECHT, W.
Die Entwicklung der Arznei- und Gewürz-
pflanzenproduktion in Österreich. (The
development of medicinal plant and herb
production in Austria.) [French summary
½ p.]
Mat. veget., 1953, 1: 312-20.
- g MARCUS, A.
Über die Sisalagave und ihre Züchtung in
Ostafrika. (The breeding and selection of
sisal in East Africa.) [French summary
½ p.]
Mat. veget., 1953, 1: 300-9, bibl. 14.
A review of the German literature on the
subject.
- h MATTHIAS, W.
Halbmikromethoden zur Serienbestimmung
von ätherischem Öl, Estermenthol, Menthol
und Menthon in Pfefferminze. (Semi-
micro methods for the serial determination
of essential oil, ester menthol, menthol and
menthone in peppermint.)
Züchter, 1953, 23: 161-7, bibl. 24, illus.
- i NAVES, Y.-R.
Emploi de la statistique pour l'appréciation
analytique des huiles essentielles. (The
application of statistics in the analysis of
essential oils.) [English summary 10 lines.]
Mat. veget., 1953, 1: 129-34, bibl. 1.
- j DE RAFOLS, W.
Análisis cromatográfico de los hidratos de
carbono del *Taraxacum kok-saghyz*. (The
analysis of the carbohydrates of *Taraxacum
kok-saghyz* by paper chromatography.)
[English summary ½ p.]
Mat. veget., 1953, 1: 278-87, bibl. 13.
- k SÁNCHEZ-MARROQUÍN, A., AND HOPE, P. H.
Agave juice; fermentation and chemical
composition; studies of some species.
J. agric. Food Chem., 1953, 1: 246-9,
bibl. 17.
- l TAYLOR, A. L., AND LOEGERING, W. Q.
Nematodes associated with root lesions in
abacá.
Turrialba, 1953, 3: 8-13, bibl. 12, illus.
- m TYSDAL, H. M., AND RANDS, R. D.
Breeding for disease resistance and higher
rubber yield in hevea, guayule, and kok-
saghyz.
Agron. J., 1953, 45: 234-43, bibl. 20, illus.

FLORICULTURE.

General.

(See also 3704, 3756, 4000, 4146, 4175, 4176, 4734.)

4414. U.S. DEPARTMENT OF AGRICULTURE.

Improving greenhouse soils.

Rep. agric. Exp. Stats, U.S. 1952, 1953,
p. 44.

A 2-year study in Connecticut showed that the most effective materials for providing good tilth for soil in greenhouse benches were sawdust, peat, muck, cow manure and sugar cane [trash?] in the order given. The organic materials highest in cellulose such as sawdust and sugar cane, however, resulted in an unbalanced N supply, adversely affecting greenhouse crops. In Hawaii, anthuriums grow well in macadamia nut hulls, coffee parchment and cane trash, moderately in leaf mould, taro pulp and tree fern fibre, and poorly in volcanic cinders, soil or wood shavings.

4415. PENNINGSFELD, F.

*Nährstoffentzug und optimale Düngungshöhe
im Zierpflanzenbau. (Levels of nutrient
absorption and manuring in the cultivation of
ornamental plants.)*

Bayer. Gärtnerei-Verband E. V., 1952,
pp. 80, bibl. 26, 13 plates.

The author discusses the first 3 years' work of a long-term investigation of the nutrient requirements of ornamental plants. These are some of the results obtained: I. *The absorption of nutrients by economically important pot plants:* Analysis of the 17 plants examined for N, P₂O₅, K₂O, CaO and MgO showed great differences in the composition of shoot, flower and root, a consideration of which would allow better timing of fertilizer applications. Levels of nutrient absorption varied greatly in different species, the total amount needed to produce 100 g. dry matter ranging from 2.72 g. in *Erica gracilis* to 14.17 g. in *Zantedeschia* (arum). The ratio of nutrients in the composition of the plants has been calculated and the figures obtained are a guide to the assessment of manurial requirements. The mean ratio for all the plants for N: P₂O₅: K₂O: CaO: MgO was 1:0.33:1.42:0.80:0.32. The effect of disease and waterlogging on the uptake of nutrients is discussed for *Erica gracilis*. II. *Optimum level of manuring and salt tolerance in some pot plants and cut flowers.* The second part of the book is mainly concerned with optimum concentrations of nutrient salts, which were found to range from 0.3-0.5% in the carnation variety John Briry to 0.05-0.1% in *Erica gracilis*. In several plants salt tolerance varied with the

developmental stage. It was also shown that salt concentration affected the date of flowering. Relatively high concentrations induced earliness, for instance in chrysanthemum and carnation, and delayed flowering in gloxinia and cyclamen. In a third group, which includes azalea, the optimum concentration remained the same for the vegetative and flowering phases. At low concentrations leaf colour was generally pale, indicating N deficiency. As the concentration increased, the colour became dark-green on approaching the optimum and turned yellowish (chlorotic) or blue-green when this level was exceeded. Plants susceptible to salt injury, such as primula, azalea and erica, tended to exhibit symptoms of chlorosis, while a dark-blue discoloration appeared in gloxinia and cyclamen. These phenomena were accompanied by deformation of the leaves. With most plants high salt concentrations inhibited root development, and it was in the roots of the more susceptible species that symptoms of salt injury first appeared. In all cases the concentrations favourable to root development were lower than the optimum concentrations for shoot, foliage and flower. Usually, optimum concentrations were associated with a low % dry matter content. The more the concentration deviated—in either direction—from the optimum value, the higher became the % dry matter content of the plant. Responses to all treatments were more pronounced in sand culture than in soil. The text is well supported by tabulated data, diagrams and photographs.—Inst. f. Bodenkunde, Weihenstephan.

4416. FJELDDALEN, J.

Systemiske fosformidler mot skadedyr på pryddplanter. (Systemic phosphorus compounds against pests of ornamental plants.) *Gartneryrket*, 1953, 43: 295-7.

Trials with systemic insecticides against pests of ornamental plants were carried out in the glasshouse and in the open from 1950 to 1952. The tabulated data show that Pestox was effective against aphids (on cineraria and cyclamen) and *Tetranychus althaeae* (on carnation) during the 6 summer months, while Systox in addition to these pests also controlled *Ditylenchus dipsaci* (on hydrangea), *Pseudococcus maritimus* (on fuchsia) and *Lecanium hesperidum* (on *Hedera canariensis* and *Ixora* hybr. Fraseri). In summer, spraying gave protection for 2-3 weeks and watering of pot plants for 5-6 weeks, treatment in winter being effective for longer periods. The results of a few further trials with some other pests and hosts and the factors affecting insecticidal action are also briefly discussed.

4417. JEFFERSON, R. N., AND MACK, G. E.

Control of certain greenhouse insects and mites with tetraethyl dithiopyrophosphate smokes.

J. econ. Ent., 1953, 46: 120-3, bibl. 1.

Tetraethyl dithiopyrophosphate as an insecticidal smoke was effective against 13 insect and mite species, and some unidentified aphids. It was not effective against *Tarsonemus pallidus* and resistant forms of *Tetranychus bimaculatus*. More than 140 species of greenhouse plants were treated without injury.

4418. N.S.W. DEPARTMENT OF AGRICULTURE, ENTOMOLOGICAL BRANCH.

Thrips.

Agric. Gaz. N.S.W., 1953, 64: 144-7, illus.

Notes are given on plague thrips (*Thrips imaginis*), onion thrips (*T. tabaci*), black thrips (*Heliothrips haemorrhoidalis*), gladiolus thrips (*Taeniothrips simplex*) and tomato thrips. Recommendations are made for their control with contact sprays, foliage poison sprays and dusts.

Annual and herbaceous plants.

(See also 3695, 3736, 3749, 4081, 4167, 4196, 4285, 4316, 4488d, h, m, q, w, x.)

4419. WILLIAMSON, C. E.

Powdery mildew control on some ornamental plants.

Bull. N.Y. St. Flower Grs., 1953, No. 93, pp. 2, 4, bibl. 2.

As an eradicant against powdery mildew Mildex (dinitro capryl phenyl crotonate) proved to be by far the most effective of several fungicides tested. Effective control, without plant injury, was obtained on chrysanthemum, calendula, delphinium, euonymus, gerbera, hydrangea, saintpaulia and snapdragon. Too high concentrations, however, will cause plant injury, and 3-4 oz. Mildex in 100 gals. water with a wetting agent is recommended. The foliage should not be allowed to remain wet too long and the leaf temperature should not be too high or burning will occur.

4420. JACKS, H., AND ROSSER, H. W.

Damage to flower seedlings and plants by application of HETP (TEPP) insecticide.

N.Z. Gdnr., 1953, 9: 600-2, illus.

HETP was applied at 3 concentrations to 34 herbaceous plants both in the seedling stage under glass and as mature plants outdoors. Only annual statice, calliopsis, dahlia, pansy, viola and violet escaped damage. Most of the others, except aster, balsam, calendula, candytuft, celosia, godetia, petunia, scabiosa, Shirley poppy, sweet pea and zinnia, tolerated a concentration of $\frac{3}{4}$ pt. of 16-20% HETP per 100 gal., but injuries were widespread at concentrations of 1 pt. or 2 pts.

4421. LUNT, O. R., SCIARONI, R. H., AND BOWLES, E. J.

Commercially grown carnations. Studies in soil fertility control made to determine optimum fertilization for production of ornamentals.

Calif. Agric., 1953, 7 (6): 13.

Soil tests showed that with bench grown carnations in the San Francisco Bay area large quantities of N and K are removed from the soil by plant absorption or through leaching. In trials in two greenhouses marked responses in yields of blooms were produced by N and, in one case but not the other, by K; there was no response to P. It is evident that the need for soil testing would be obviated under similar conditions if fertilizers were applied at rates per 100 sq. ft. equivalent to 0.25-0.40 lb. N per month, 0.15-0.25 lb. K₂O per quarter and 1 lb. P₂O₅ per annum.

4422. MULCOCK, A. P.

Carnation leaf-rot. New disease recorded in New Zealand.

N.Z. Gdnr., 1953, 9: 607.

The leaf-rot disease of carnations caused by *Heteropeltella veltellinensis* was first noted in New Zealand in 1951. Spraying with bordeaux mixture or copper

oxychloride gives some protection. Cuttings developing the disease should be destroyed immediately.

4423. DOSSE, G.

The greenhouse spider mite *Tetranychus urticae* Koch forma *dianthica* and its control.

Höfchen Briefe (English Ed.), 1952, 5: 239-67, bibl. 49, illus. [received August 1953].

Detailed morphological and biological studies suggest that the mite infesting carnations is a subspecies of the hop spider mite and the name *Tetranychus urticae* f. *dianthica* is proposed. The carnation spider mite is difficult to control on account of its resistance to parathion. Good results against the mobile stages of the pest were, however, achieved by 5 applications of Systox (0.05%) at 5-day intervals or by 4 treatments at a concentration of 0.08 or 0.1%. A repetition of this schedule after 4-6 weeks, according to temperature, is advisable.—Landw. Hochschule, Stuttgart-Hohenheim.

4424. PAPE, H.

Eine ungewöhnliche Schädigung an Edelnelken. (An unusual injury to carnations.) Reprinted from *Gesunde Pfln*, 1953, No. 4, pp. 1½, illus.

In a glasshouse, a young rat caused great damage by biting off carnation flowers, showing a marked preference for the bright red variety William Sim.

4425. DOWRICK, G. J.

The chromosomes of chrysanthemum. II. Garden varieties.

Heredity, 1953, 7: 59-72, bibl. 10, illus.

The chromosome numbers of the English varieties lie between 47 and 63. In both English and Japanese varieties there is a correlation between inflorescence size and chromosome number. Variation in chromosome number within plants accounts for the origin of new varieties as vegetative sports. In some families of sports varying in chromosome number there are differences in (i) flower colour, (ii) leaf shape and (iii) resistance to disease. [From author's summary.]—John Innes hort. Instn, Bayfordbury.

4426. KAMEMOTO, H., AND NAKASONE, H. Y.

Controlling chrysanthemum flowering by altering daylength.

Circ. Hawaii agric. Exp. Stat. 38, 1953, pp. 11, bibl. 4, illus.

Chrysanthemums are short-day plants requiring a maximum day-length of 14½ hours for flower bud initiation and 13½ for flower development, and in Hawaii, where the longest and shortest days are 14½ hours and 11 hours 19 min. respectively, they normally flower in autumn and, from suckers, in January/February. Shading to induce summer flowering is uneconomical but many varieties can be timed precisely from autumn to May (during which period the days are short enough to effect bud formation and flowering) by exposure to long-day conditions by means of artificial light until the time when flower bud initiation is desired. With 75-watt bulbs lamps should be mounted 4 feet above the ground and 6 feet apart. Schedules are given for a 9-week variety to flower at Christmas and Easter and for an 8-week variety to flower in October,

January and April. There are considerable varietal differences in responses to day-length.

4427. BARNES, H. F.

The Shasta daisy midge and other insects in flowers of *Chrysanthemum* species.

Plant Path., 1953, 2: 52-3.

The recent occurrence of the gall midge, *Contarinia chrysanthemi*, as a pest of Shasta daisy in the Newcastle-on-Tyne area, made it desirable to know more about its life history and bionomics, its distribution on wild ox-eye daisy, and the possibility of its spreading to other cultivated chrysanthemums. In tests, females oviposited in the flower buds of *Chrysanthemum carinatum*, *C. cinerariaefolium*, *C. frutescens*, *C. leucanthemum* and Sweetheart chrysanthemum. Notes on the life history of the midge are given.—Rothamsted exp. Stat., Harpenden.

4428. SWANSON, C. L. W.

A new concept—Using chemicals for soil structure improvement.

J. Soil Water Conserv., 1952, 7: 61-7, from abstr. in *Soils and Ferts*, 1952, 15, No. 1739.

Krilium had a deleterious effect on geraniums grown in soil consisting of 4 parts fine sandy loam, one part manure, one part peat and one part coarse sand. Lime and fertilizer were added and then 0.10% CRD 186. Stem rot developed in the krilium-treated soil and leaves were wilted and yellow; plants in untreated soils were healthy. Once krilium-treated soil becomes thoroughly dried out in the greenhouse it is difficult to wet the soil again and the water runs off the surface.—Conn. agric. Exp. Stat., New Haven.

4429. SILBERSCHMIDT, K.

Studies on a mosaic of nasturtium occurring in Brazil.

Phytopathology, 1953, 43: 304-8, bibl. 8, illus.

Nasturtium plants grown commonly in São Paulo, Brazil, for ornamental purposes often display symptoms of a mosaic disease characterized by mottling, veinbanding, crinkling of the leaves, and in extreme cases dwarfing of the whole plant. The disease is transmissible by plant extracts. Its incidence and characteristics are discussed in detail.

4430. VAN STEEN, J.

Belichtingsproef met *Primula obconica*. (An illumination trial with *Primula obconica*.)

Cult. Hand., 1953, 19: 344-5, illus.

Primula obconica plants, sown on 1 August, were given the following treatments from 4 December onwards: (1) extra illumination from 5 p.m. to 8 p.m. nightly, i.e. continuous light, (2) extra illumination from 5 p.m. to midnight nightly, (3) no extra illumination. The plants given continuous light were much larger than the controls and flowered about a month earlier, i.e. on 18 January, but the leaf and flower tissues were too soft. The plants given the shorter period of illumination were intermediate in growth and time of flowering. It is thought that flowering could be hastened without causing softness of the tissues by giving extra illumination after the flower stem has formed.

4431. KRAUSE, W. G. C.

Soil-sickness and sweet peas.

Comm. Grower, 1953, No. 2997, p. 1191.

Soils of high humidity and high salt concentration encourage the development of the fungus *Thielaviopsis basicola* which is responsible for the disease of sweet peas known as "soil sickness". The only reliable preventive measure is soil sterilization by steam or chemicals.

4432. HUERTOS, M. R.

"Zinnia mosaic", a new virus.

Plant and Soil, 1953, 4: 303-7, bibl. 7, illus.

The properties of a virus isolated from *Zinnia elegans* are described and compared with those of 9 other viruses known to affect zinnias and with those of some related viruses. The host range, transmission and physical properties of the virus under study differ from those of the other viruses. It is therefore concluded that this virus has not previously been described, and the name *Zinnia mosaic virus* is proposed.—Inst. Fis. veg. Cons. Invest. cien., Madrid.

Bulbs, tubers, etc.

(See also 3749, 3898, 4488b, f, g, l, n, o, p, r, 4729.)

4433. CROSSLEY, J. H.

Suggestions for shipping spring flowers.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 30-1.

The procedure employed by British Columbia growers in packing cut daffodil, tulip and iris flowers for air transport is described.

4434. GOULD, C. J., BREakey, E. P., AND COURTNEY, W. D.

Bulb treatment recommendations for fall, 1953.

Stat. Circ. Wash. St. agric. Exp. Stat. 224, 1953, pp. 3.

Recommendations are made for the control of diseases and pests attacking the corms or bulbs of gladiolus, iris, lily, narcissus, and tulip.

4435. BOSHER, J. E.

Rotation and sanitation in nematode control.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 8-10.

Direct measures for control of nematodes such as bulb treatment and soil fumigation are indispensable but they must be complemented by special sanitary and crop rotation practices. As a general principle, rotation crops for infested land should be short-seasoned crops as different as possible in type from the bulb crop. The cleaning and disinfecting of bulb houses, trays, implements and other disseminating agencies are outlined.

4436. GRANITI, A.

Nuova alterazione della calla in Sardegna e sua importanza fitopatologica. (Nota preliminare.) (A new disorder of the arum lily in Sardinia and its phytopathological importance. Preliminary note.)

Riv. Ortoflorofruttic. ital., 1953, 37: 100-1, bibl. 2, illus.

A description is given of a new disorder of the arum lily (*Zantedeschia aethiopica*) observed in Sardinia in 1951. The disorder, of which the chief characteristic is a marked dwarfing, somewhat resembles tomato

spotted wilt, but the leaves and spathe were not spotted in the plants under observation.

4437. HORTON, F. F.

Keep begonias vegetative.

Bull. N. Y. St. Flower Grs, 1953, No. 92, p. 2.

Begonia socotrana, which normally flowers at Christmas, is more suitable for propagation purposes in April and May if it can be kept in a vegetative condition. Experiments are reported on the effect of temperature and day-length on inhibiting flowering. It was found that the Dutch hybrids would not flower in either long or short days when kept at 80° F. The varieties Melior, Marjorie Gibbs, Lady Mac and Tove, kept at 80° F., all flowered during normal short days but no buds were initiated with a day-length of 15 hours. At 60° F. all these varieties flowered in both long and short days but flowering was later in long days. Tove flowered 2-3 weeks earlier than the other varieties when grown at 60° F. and was less affected by temperature or day-length.

4438. SUSINI, E.

Il ciclamino. Coltura forzata. (Forcing cyclamen.)

Riv. Ortoflorofruttic. ital., 1953, 37: 141-7, illus.

Notes are given on culture, control of pests and diseases, and marketing. The plants are grown as biennials and the time table is: (1) first year—sow in boxes in the greenhouse in July-August and prick out in September-October; (2) second year—seedlings ready for sale in February-March, first potting in February-March, repotting in May-June and August-September, pollination in November-December, plants in flower ready for sale November-January; (3) third year—seed collection May-June, seed ready for sale July-August.—Ist. tec. agrar. statale Firenze.

4439. JAENICHEN, H., AND HEINEMANN, M.

Beizung von Cyclamensamen. (The disinfection of cyclamen seed.)

Gartenwelt, 1953, 53 (1): 8-9, from abstr. in *Z. PflKrankh.*, 1953, 60: 335.

Preliminary trials with various seed disinfectants showed that 30 minutes' treatment with a 0.1% solution of Germisan improved germination in cyclamen. As bad germination in this species is largely due to genetical and physiological causes, only partial success can be expected from seed treatment.

4440. BODENSTEIN, G.

Cyclamen-Schäden durch *Cacoecia costana* F. (Injuries to cyclamen by *Cacoecia costana*.)

Gesunde Pfln, 1952, 4: 180-1, from abstr. in *Z. PflKrankh.*, 1953, 60: 318.

In a nursery in the Rhineland larvae of *Cacoecia costana* caused severe damage to the above-ground parts of cyclamen. Other flowers were also attacked by the pest in the same area. Spraying with nicotine proved the best method of control.

4441. DUNBAR, R. H.

Taping gladiolus seed.

Gladiolus Mag., 1952, 16 (2): 21-3, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 17686.

Gladiolus seed are placed on dabs of glue on Scot tissue. Seeds are labelled, and rolled when dry. This is a convenient way to handle hard-to-plant seeds.

4442. GOSS, O. M.

Corm rots of gladioli.

J. Agric. W. Aust., 1953, 2 (n.s.): 245-53, illus.

The corm and field symptoms and control are given for bacterial scab and neck rot (*Pseudomonas marginata*), hard rot (*Septoria gladioli*), dry rot (*Sclerotinia gladioli*), core rot (*Botrytis*), fusarium rot (*F. oxysporum*), and fusarium yellows (*F. orthoceras*).

4443. BALD, J. G.

Neck rot phase of the botrytis disease of gladiolus.

Phytopathology, 1953, 43: 167-71, bibl. 8, illus.

Gladiolus neck rot (*Botrytis gladiolorum*) consists typically of "aggressive" and persistent lesions similar to aggressive lesions on the green leaf blade, and develops mainly from inoculum carried on corms or from air-borne spores. Continued high humidity and temperatures of 55-65° C. at and below soil level favour the development of the disease.—Univ. Calif., Los Angeles.

4444. BUXTON, E. W., AND ROBERTSON, N. F.

The fusarium yellows disease of gladiolus.

Plant Path., 1953, 2: 61-4, bibl. 9, illus.

A preliminary account of the status of fusarium yellows in Britain. Symptoms and inoculation experiments are described. The identity, distribution and control of the organism are discussed.—Bot. School, Cambridge.

4445. MOORE, W. C., AND TOMLINSON, J. A.

Corm rot of gloxinia.

Plant Path., 1953, 2: 71, illus.

Notes on a gloxinia corm rot of unknown cause which was unusually prevalent in 1951 but of which little is heard most years. In some corms the internal tissues were soft, wet and pink, yellow or chocolate, or developed such coloration within a few minutes of cutting. In others there were one or more distinct dark brown lesions extending inwards from the surface. Sometimes both symptoms were present in the same corm.—Plant Path. Lab., Harpenden.

4446. GOULD, C. J., AND STUART, N. W.

Iris variety trials.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 26-9.

The forcing performance of iris varieties at Beltsville, Md, in 1951/52 and 1952/53 is discussed and the results are tabulated. During both seasons Moonlight was the earliest variety. Brief notes are given on the quality and quantity of flowers produced, effects of forcing temperatures, storage treatments and bulb rot (*Fusarium* and *Penicillium*) incidence.

4447. COURTNEY, W. D.

Proper storage of hot-water treated iris.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 6-8.

The hot-water-formalin treatment (3 hrs at 110° F.) of iris bulbs, given prior to planting, has become a standard practice among Pacific Northwest growers to free the stock from bulb and stem nematodes (*Ditylenchus*

spp.). An experiment conducted on Wedgewood iris to determine the best method of storing treated bulbs has shown that warm storage (80° F.) 3 weeks prior to treatment followed by cool storage (60° F.) after treatment was the most satisfactory combination tried, giving the highest yield of bulbs. Deviations from these storage conditions resulted in excessive flower production.

4448. PATTERSON, C. F.

Progress in the development of certain hardy hybrid types in the genus *Lilium*.

From abstr. in *Agric. Inst. Rev.*, 1953, 8 (3): 27.

A breeding programme, primarily for the development of hardy lilies for the Western Provinces, has been carried on over a period of 18 years in the Department of Horticulture, University of Saskatchewan, Saskatoon. The main objectives have been the development of pink-flowered lilies and white-flowered lilies possessing the hardiness necessary for this region of Canada. Several new varieties have been introduced.

4449. MASTALERZ, J., AND CATHEY, H. M.

Water and soil temperatures do not affect flowering of *Lilium longiflorum*.

Bull. N.Y. St. Flower Grs, 1953, No. 95, pp. 2-3, bibl. 1.

Croft and Erabu lilies were grown in a greenhouse with a night temperature of 60° F. and a day temperature range of 70° to 75° F. In one trial when the soil was kept at a constant temperature of 80° F. growth was quicker than when it was kept at 60° F., but flowering was not hastened. When soil temperature was maintained at 40° F. the plants made little growth and failed to produce the full number of flower buds. In a second trial, applying water daily at temperatures of 35°, 50° and 130° F. had no effect on time of flowering, and only affected soil temperatures slightly for a short time.

4450. HORNBACK, E.

Breeding daffodils and Dutch iris.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 20-6.

Notes are given on some of the new, including pink, varieties of daffodil developed and introduced at Oregon Bulb Farms. In iris breeding only preliminary work has as yet been done.

4451. DOUCETTE, C. F.

Control of narcissus bulb fly—a progress report.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 12-15.

The preplanting immersion of narcissus bulbs in emulsions of aldrin, chlordane, heptachlor and dieldrin gave good control of narcissus bulb fly larvae, but at present no specific recommendations can be made.

4452. FLORENCHIE, P., AND THÉAU, A.

La tulipe en Algérie. (The tulip in Algeria.)

Rev. hort. Algér., 1953, 57: 49-55.

The Jardin d'Essai began varietal trials with European commercial tulips in 1948. No variety tested has proved wholly suited to the Algerian climate but a few develop normally, have long stems, produce good early fertile flowers and do not degenerate. A list is given of the

most promising early and late varieties. Notes are given on cultural technique and marketing.

4453. CROSSLEY, J. H.

Tulip storage temperature and flower embryo development in relation to forcing of B.C. bulbs.

Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 33-8, bibl. 5.

Flowering performance of British Columbia tulips under greenhouse conditions was investigated for 4 years at Saanichton. Preheating at 75°, 80° or 95° F. for short periods after harvest resulted in no consistent or practical benefit in quality or uniformity of flowering. In all 4 years great variability existed in embryo flower stadia between individual bulbs regardless of temperature treatment during storage. Stage of embryo development for determining when tulip bulbs are ready for a different storage temperature was shown to be unreliable. Successful and uniform flowering in January and February with B.C. tulips is best assured (a) by precooling at 48° F. for one month commencing about the middle of August; (b) by rooting at a steady cool temperature (48° F.); (c) holding greenhouse temperature at 63° F. until growth starts, then raising to 68-70° F. until buds show colour and then lowering to 63° F. again. [From author's summary.]

Lawns.

4454. VAUGHN, J. R.

Snow molds: their prevention and cure.

Golf Course Rep., 1952, 20 (6): 11, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 17979.

Several different organisms cause snow mold. Inorganic mercury compounds, e.g. HgCl-HgCl₂ mixture, are the most tested and proven chemicals for control. Fall applications of fungicides at least twice the strength used during the golfing season should be made. If not applied previous to snow fall, applications may be made on the snow if it does not exceed 2-3 in. depth. An additional application made at the time of the midwinter thaw will not injure the turf. Spring applications are advised if late spring snow and cold weather persist.

4455. SHREAD, J. C.

Isodrin, endrin and lindane for grub control in turf.

J. econ. Ent., 1953, 46: 357-9, bibl. 3.

In trials in Connecticut the new insecticides isodrin and endrin (stereoisomers of aldrin and dieldrin respectively) and lindane, used as emulsions and in dust at rates of from 0.5 to 2.0 lb. of toxicant per acre, gave good control of *Popillia japonica* and *Anomala orientalis* grubs. The killing action of spring applications, followed by rain, was much more rapid than that of late summer treatments.

Orchids.

4456. L.

Eine neue Vitrine für die Pflege von Orchideen im Zimmer. (A new glass show case for growing orchids in the home.)
Schweiz. Gärtnerztg, 1953, 56 (22): 4-5, illus.

An illustrated description is given of a ventilated, electrically heated glass show case for growing orchids and other tropical plants in the home. The case is manufactured in Zürich.

4457. DE VRIES, J. T.

On the flowering of *Phalaenopsis schilleriana* Rchb. f.

Ann. bogor., 1953, 1: 61-76, bibl. 12, illus.

The "moon orchid", *Phalaenopsis schilleriana*, will only flower in Java when grown above a certain altitude. At Bogor, which is situated at 280 m., just below the critical altitude, about 10% of the plants developed a flower stalk, which remained vegetative and produced an adventitious plant. All the plants developed stalks and were induced to flower when grown at a night temperature below 21° C. An induction period of 2-3 weeks with a low night temperature was required to induce flowering. Although flower primordia had not formed on the flower stalks within this period, flowering occurred when the plants were returned to the higher temperatures. The possible role of growth substances in the processes involved are discussed. A description is given of the macro- and microscopic morphology of the flowering and non-flowering stalks of this orchid.

4458. SLADE, G. H.

The use of copper naphthenate as a fungicide barrier in seed raising.

Aust. Orchid Rev., 1952, 17: 139-40, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 191.

Copper naphthenate is recommended for use on cotton wool stoppers as an excellent barrier against fungus and bacterial invasion of [orchid] seedling cultures under aseptic conditions. It minimizes secondary infection. The vessel containing the plug is inverted and the cotton wool dipped in a solution of the fungicide in an organic solvent. A week is allowed to elapse for the solvent to evaporate. The impregnated plugs must not be autoclaved or flamed.

4459. MOTT, R. C.

Water orchids daily.

Bull. N.Y. St. Flower Grs, 1953, No. 94, pp. 3-4, illus.

Plants of *Cattleya labiata* var. *amesiana* watered daily were larger and produced more pseudo bulbs and flowers than plants watered less frequently.

4460. ROTOR, G. B., Jr.

Daylength and temperature in relation to growth and flowering of orchids.

Bull. Cornell agric. Exp. Stat. 885, 1952, pp. 47, bibl. 19, illus.

The types of flowering behaviour, bud primordia and flowering characteristics of the orchid species studied are described and illustrated by drawings. The effect of temperature and day-length on the vegetative growth and on flowering of 7 species of *Cattleya*, several *Cymbidium* hybrids, 2 species of *Dendrobium*, *Phalaenopsis* spp. and *Paphiopedilum insigne* is discussed, and appropriate treatment is suggested for the required response. A table is also given showing the minimum temperatures suitable for the orchids for both growing and flower bud formation; when to use artificial light and the effects of long days; and when to darken and the effects of short days.

4461. DAVIDSON, O. W.

Responses of orchids to liquid fertilizers.

N.J. Plant and Flower Grs' Ass. Bull., 1952, 2 (7): 6-11, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1953, No. 95, p. 3.
CARNES, A. E.

Orchids need fertilizer too.

N.J. Agric., 1953, 35 (2): 8-9, illus.

Cattleya orchids produced greater leaf area when the osmunda was fertilized weekly with a nutrient solution, the formula of which is given. In general, growth at 3,000 and 4,000 f.c. light with fertilizer was equal to, or greater than, growth at 2,000 to 2,500 f.c. without fertilizer. At low light intensity plants made more growth without fertilizer than with it. The second paper summarizes Dr. Davidson's work and gives the formula of the most satisfactory fertilizer used.

4462. MANGLITZ, G. R.

Biology and control of *Brevipalpus australis*.

J. econ. Ent., 1953, 46: 116-19, bibl. 8, being
Sci. Art. Md agric. Exp. Stat. A38.

The omnivorous mite *B. australis*, originally known as a citrus pest, is reported since 1946 as attacking orchids. Among acaricides tested in greenhouse trials di(p-chlorophenyl) methyl carbinol gave control without apparent plant damage.

4463. SHER, S. A., KAMASAKI, H., AND MURA-KISHI, H.

Intensive spray controls nematode.

Hawaii Fm Sci., 1953, 2 (1): 2, 6, illus.

A leaf nematode [*Aphelenchoides ritzema-bosi*?] causes great losses in the cultivation of Vanda Miss Joaquim, the most widely grown orchid variety in Hawaii. Crippled flowers, yellow buds and blighted racemes are the symptoms briefly described. In earlier work repeated applications of high concentrations of parathion and other chemicals had achieved control [see *H.A.*, 22: 1747], but the expenditure involved is heavy. An alternative measure, the hot-water treatment of cuttings is now under investigation. Infection was found to occur only in areas of high rainfall; the transfer of affected plants to dry regions gradually stopped the trouble.

Succulents.

(See also 4488s.)

4464. DRAWERT, H.

Teratologische Erscheinungen an *Bryophyllum daigremontianum* Berger. (Teratologic phenomena in *Bryophyllum daigremontianum*.)

Planta, 1953, 41: 509-14, bibl. 17, illus.

An illustrated description is given of leaf malformations which occurred spontaneously in *Bryophyllum daigremontianum*. These malformations are similar to those induced in *Kalanchoe blossfeldiana* by treatment with 2,3,5-triiodobenzoic acid [see *H.A.*, 23: 1470]. Other abnormalities in *B. daigremontianum* were produced by suppressing the development of axillary buds or by the application of a cold shock. It is emphasized that the response of a plant to a growth regulator must not be attributed to the specific action of that substance.—Freie Univ., Berlin.

Roses.

(See also 3776, 4081, 4488a, e, j, 4737.)

4465. HOARE, A. H.

The English rose.

Agriculture, Lond., 1953, 60: 121-5, illus.

This survey covers: Evolution of modern roses; the rose in commercial cultivation; the florist's rose; and the rose in history and ceremony. There are photographic illustrations of 7 hybrid tea roses and of the Burnet rose (*R. spinosissima*).

4466. SAMPATH, V.

Rose growing in the Nilgiris.

Madras agric. J., 1952, 39: 505-12, from abstr. in *Biol. Abstr.*, Sect. D, 1953, 27, No. 20543.

Cultural methods for the 6 main groups of roses, general rules for propagation, pruning, pest and disease control, etc., are discussed, and the best selections for exhibition, garden display, scent, standard growing, and climbers are listed.

4467. DOAK, K. D.

The fertilization and culture of *Rosa multiflora* in Northern Indiana.

Bett. Crops, 1953, 37 (4): 19-24, 44, bibl. 8, illus.

Mixed fertilizer, 3-12-12, was found the best dressing for *Rosa multiflora*, grown as a fencing plant, in the first 2 years, giving satisfactory growth with the minimum of winter injury. Clean cultivation and moisture conservation proved valuable in obtaining strong plants, while ridging was useful in poorly drained soils. High N fertilizer produced a significant increase in leaf spot infection caused apparently by *Mycosphaerella rosigena*.

4468. WYND, F. L.

Glass frit as a source of iron and manganese for roses grown in hydroponic culture.

Lloydia, 1953, 16: 59-76, bibl. 10.

A major difficulty encountered in the commercial hydroponic culture of roses is the maintenance of an adequate supply of soluble iron and manganese in the nutrient solution. Several investigators have used various materials as a solid phase source of iron. The present study shows the suitability of glassy frit as a source of iron and manganese for roses. The frit-borne plants were equal, or superior, to those grown in complete nutrient solutions containing adequate amounts of soluble iron and manganese. Normal green plants were obtained with pH values of the nutrient solution varying from 4.0 to 7.0. Slightly better plants, however, were obtained when the pH was maintained at 5.5. Corresponding control cultures produced chlorotic plants, the chlorosis being most severe at pH 7.0. The rose plants were conspicuously more tolerant of wide variations in the pH value of the nutrient solution when their roots were in contact with the frit. Under commercial conditions, pH values from 5.0 to 6.0 would be eminently satisfactory, and even more extreme values would not seriously lessen the value of the crop. Data are presented to show that the absorption of iron by the plants depended primarily on the physical contact of their roots with the frit. The solubility of manganese was conspicuously greater

than that of iron but was markedly influenced by the pH value of the solution. [From author's summary.]

4469. HUBBARD, W. H.

Malformation studies on Better Times roses.

Colo Flower Grs' Ass. Bull., 1953, No. 39, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1953, No. 95, p. 3.

The flower malformation known as "bullheads", in which the petals are short or curve in at the edges, occurred more frequently at temperatures exceeding 75° F. than at 60°-65° F. It was most pronounced at 90° F. Buds just showing colour 6 days before opening were most seriously injured. Soil moisture had no effect on malformation. Some plants were more prone to the disorder than others.

4470. THOMAS, H. E., AND SCOTT, C. E.

Rosette of rose.

Phytopathology, 1953, 43: 218-19, bibl. 2, illus.

The symptoms are described of a rosette virus disease observed on cultivated and native roses in Wyoming and California in 1941 and 1942. Its effect on some of the roses commonly used as rootstocks in the Western U.S. and on some native roses has since been determined and is described here.—Dep. Plant Path., Univ. Calif., Berkeley.

4471. MASTALERZ, J. W.

Conditioning flowers after holding at 32° F.

Bull. N.Y. St. Flower Grs., 1953, No. 94, p. 2.

After cut Better Times roses had been wrapped in cellophane and held dry for 15 to 18 days at 32° F. it was found that the amount of water subsequently absorbed and retained was greater when they were placed in water of 100° F. at an air temperature of 40° F. than when lower water and higher air temperatures were used. Cutting the base of the stems increased water uptake, but was more important at room temperature than at an air temperature of 40° F.

Other trees and shrubs.

(See also 3991, 4419, 4488c, i, k, v, 4514.)

4472. DE VOGEL, P.

Boomteelt. (Raising trees and shrubs.)

P. Noordhoff N. V., Groningen, *E.L.T.O.-Serie* 37, 1953, 9×6 in., pp. 120, illus., fl. 2.70.

This is a simple, practical handbook for those engaged in the very specialized industry of raising ornamental trees and shrubs, forest trees and fruit trees, which is centralized in Boskoop and certain other districts of Holland. As 80-90% of the plants raised are for export the requirements are very exacting. Information is given on the glasshouse structures used, soils, manuring, propagation by seed and vegetative means, the use of growth substances, rootstocks, pruning and training, packing and marketing, and pest control. A chapter is devoted to the culture of some of the more important species, including rhododendrons and azaleas, conifers, avenue trees and fruit trees.

4473. WELLS, J. S.

Outdoor propagation under constant mist.

Amer. Nurserym., 1953, 97 (11): 14, 51-8, illus.

The construction of outdoor rooting benches and

operation of fog lines providing constant mist is outlined. Cuttings of plants normally difficult to root were inserted into suitable rooting media in July, and kept under conditions of high temperature, extreme sun intensity and ample water supply for about 8 weeks. Azaleas of almost all varieties were outstandingly successful, as were magnolias. Results with other shrubs, notably *Juniperus stricta* and a hybrid French lilac, were disappointing.

4474. THORNE, D. W., AND WANN, F. B.

Chlorosis-resistant shrubs.

Amer. Nurserym., 1953, 97 (10): 12.

A field test of the relative resistance of a number of ornamental shrubs and shade trees to lime-induced chlorosis was conducted at the Utah Agricultural Experiment Station, Logan. Twenty-eight shrubs and 12 trees are listed according to their resistance. The susceptible species were found to suffer most from winter killing.

4475. CHAIMOVICH, M. L.

Os hormônios no enraizamento de estacas de plantas ornamentais. (The use of hormones for the rooting of cuttings of ornamental plants.)

Bol. Agric. Minas Gerais, 1952, 1 (3): 29-37, bibl. 4, illus.

In an experiment with *Buxus* cuttings at the Instituto Agrônomico do Estado de Minas Gerais, the use of Estimurhiz A (β indoleacetic acid), in powder form, resulted in greater production of roots than Estimurhiz B (α naphthylacetic acid), and the dusting method of application was better than the immersion method.

4476. WENT, F. W.

The camellia's secrets revealed by scientific research.

Pacific Monthly, reprinted in *N.Z. Gdnr.*, 1953, 9: 549-51.

In controlled temperature and light experiments at the California Institute of Technology, Pasadena, it was found that camellias did not react to length of day but required warmth to form flower buds. Plants kept at night temperatures below 60° F. failed to form any flower buds. By providing warmth in winter and cool conditions in summer plants were induced to flower in mid-summer. For propagation by cuttings treatment with naphthaleneacetamide-talc dusts at about 1:1,000 has greatly accelerated rooting. It has also been shown that the camellia does not produce enough B₁ for its needs; hence the advisability of providing peat, leaf mould or good garden soil.

4477. NAKASONE, H. Y.

Ornamental hibiscus, its production and culture.

Circ. Hawaii agric. Exp. Stat. 37, 1953, pp. 14, bibl. 8, illus.

Propagation methods described include cuttings, marcottage, grafting on rooted cuttings or seedlings, topworking and seed.

4478. VERNEAU, R.

Marciume della corona fogliare di *Howea forsteriana*. (A bud rot of *Howea forsteriana*.) [English summary 5 lines.]

Ann. Sper. agrar., 1953, 7: 525-38, bibl. 37, illus.

Notes are given on a bud rot in the ornamental palm *Howea forsteriana* and on the morphology and biology of the causative fungus, *Phytophthora palmivora*. The disease is characterized by a centripetal desiccation of the leaves and causes death in 3-5 months. Control recommendations include spraying the stem and spathe with bordeaux mixture, soil application of dilute CuSO_4 , control of scales and avoidance of farmyard manure.—Lab. sper. Pat. veg., Portici.

4479. BURNS, W.

A study of the vegetative propagation of plants, with special reference to the root-initials of *Jasminum nudiflorum* Lindl.

Trans. bot. Soc. Edinb., 1953, 36: 84-98, bibl. 26, illus.

Anatomical studies and propagation experiments with cuttings at different times of year were carried out to investigate the formation of adventitious root initials in shoots of *Jasminum nudiflorum*. In particular the effects of leaves, vascular strands and growth substances on root initiation were studied. It is concluded that "the presence of adventitious roots is a primitive phenomenon which may persist in certain plants with creeping stems and in *Jasminum nudiflorum*, whose hanging branches are tending in that direction and do, in fact, root where they touch the ground, and that in many plants such adventitious rooting can be re-awakened by cuttings, marcottes or layers."

4480. WISTER, J. C.

Lilacs. Parts I and II.

Amer. Nurserym., 1953, 97 (11): 12-13, 35-6 and 98 (1): 16-17, 66, illus.

An informative article, Part I of which deals with the present status of the plant in the United States and calls attention to some fine varieties of the common lilac, *Syringa vulgaris*. Part II discusses some little-known species from China and other Asiatic countries.

4481. BRIDGERS, B.

Propagation of hybrid rhododendrons by stem cuttings.

Amer. Rhododendron Soc. quart. Bull., Oct. 1952, and Jan. 1953, from abridged version in *Nat. hort. Mag.*, 1953, 32: 127-40, bibl. 11, illus.

A detailed series of studies on the propagation of rhododendrons by stem-cuttings gave the following, among other, results: 1. Tannic acid content, highest in 1-year-old stems, was not related to ease of rooting. 2. Treatment with citric acid, alone or combined with wax, did not prevent basal discoloration and has no practical effect on rooting. 3. Cuttings from 1-year-old wood had rooted better after 11 weeks than cuttings from 2-year-old wood; the latter did not respond to treatment with Hormodin 3. 4. The presence of flower buds proved detrimental to rooting. 5. Wounding the base of the cuttings followed by treatment with Hormodin 3 resulted in an increased percentage rooting and better root development than treatment with Hormodin 3 alone; wounding by slicing proved better than wounding by slitting or stripping the bark. 6. Wounding increased moisture uptake and respiration. 7. Combining Hormodin 3 with Fermate in the ratio 3 to 1 gave better rooting than Hormodin alone; a further improvement resulted when wax was used

with these treatments. 8. Hormodin 3 appeared better than indolebutyric acid at the concentrations tested. 9. The need for controlling light, temperature and humidity was indicated, but further work is necessary to determine optimum conditions. 10. Increasing the oxygen concentration in the rooting medium above the normal increased the percentage rooting, whereas reducing the oxygen concentration proved detrimental. 11. The factors, which in combination produced the highest percentage rooting and the heaviest root systems under uncontrolled conditions of light, temperature and humidity, were the use of 1-year-old wood without flower buds, sliced at the base, treated with Hormodin 3—Fermate at 3: 1, then waxed, and rooted in a 1: 1 sand-peat medium.

4482. WELLS, J. S.

Propagation of rhododendrons from stem cuttings.

Amer. Nurserym., 1953, 97 (9): 10-11, 60-73, illus.

The greater part of this paper is essentially the same as that published in R.H.S. Rhododendron Year Book 1953 [H.A., 23: 2131], but additional information is provided on the planting out and after-care of young plants.

4483. KRAUS, E. J.

Rooting azalea cuttings.

Nat. hort. Mag., 1953, 32: 163-4.

In one trial cuttings of several clones of 3 deciduous *Rhododendron* species taken on 25 May, treated with Hormodin No. 2 and set in a 1: 1 peat moss-sand mixture had all rooted by 28 August. When subsequently planted in seed boxes and held in a greenhouse a few cuttings produced a few terminal leaves but none produced flower buds. By contrast cuttings taken on 5 July and otherwise similarly treated either withered rapidly or formed terminal flower buds and only 2% rooted. In a second trial with 2 forms of the evergreen *R. macrantha*, cuttings of one clone rooted well whether dipped in Hormodin No. 2 powder or not, whereas cuttings of a second clone rooted well without Hormodin but failed completely when treated with the growth substance.

4484. KERR, T. W., Jr.

Control of rhododendron whitefly, woolly larch aphid, rose scale and southern red mite.

J. econ. Ent., 1953, 46: 353-5, bibl. 7, being *Contr. R.I. agric. Exp. Stat.* 812.

During trials in 1952 DDT was most effective against the rhododendron white fly, *Dialeurodes chittendeni*; nicotine sulphate against rose scale, *Aulacaspis rosae*; 3% petroleum oil and 2% petroleum oil+1 pt. of nicotine sulphate against woolly larch aphid, *Chermes strobilobius*; and chloroethyl butylphenoxymethyl ethyl sulphite or p-chlorophenyl p-chlorobenzene sulphonate included in the DDT sprays against southern red mite, *Paratetranychus ilicis*.

4485. FOWLER, V. W.

The azalea white fly.

J. roy. hort. Soc., 1953, 78: 218-19, bibl. 7, illus.

A heavy infestation of azalea white fly, *Aleyrodes*

azaleae, was observed on *Rhododendron mucronatum* at Wisley in 1952. The insect has only been reported in Britain once before, in 1931. Observations showed that other species, varieties and hybrids of the sub-series *obtusum* were also attacked. As all stages of the insect were present in October it is thought that breeding is continuous throughout the summer. Control experiments with DDT are being carried out at Wisley.

4486. SIMINOVITCH, D., AND BRIGGS, D. R.
Studies on the chemistry of the living bark of the black locust tree [*Robinia pseud-acacia*] in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness.
Plant Physiol., 1953, 28: 177-200, bibl. 26, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2880.

A positive correlation was found to exist between the water-soluble protein content (in excess of a summer minimum) and the degree of hardiness of the tissues under all conditions studied. No such relationship was indicated for the other components for which analyses were made. Synthesis, in autumn, of the water-soluble proteins is dependent upon the prior accumulation in the bark tissue of some factor which must reach the bark cells through phloem transport before their isolation, by ringing, from the leaves (or root) of the tree. This factor appears to be mobilized from the leaves only in late summer and autumn, reaching maximal transport in September just prior to leaf abscission. [From authors' summary.] [See also *H.A.*, 19: 3330 and 23: 3386.]

4487. NEISWANDER, R. B.
Control of the black vine weevil.
J. econ. Ent., 1953, 46: 234-7, bibl. 7.

In Ohio, black vine weevil, *Brachyrhinus sulcatus*, injury has been most severe on the roots of *Taxus* in commercial nurseries, but injury has also been observed on rhododendron and azalea. One well-timed foliage application, which was found superior to soil treatment, may give complete control of the insect. Good results have been obtained most consistently with aldrin, dieldrin and heptachlor, all applied at 1 lb. per 100 gal. DDT and chlordane sprays of the same concentration were also effective.

Noted.

4488.
a AUBERSON, A.
Roses nouvelles. (New rose varieties.)
Rev. hort. Suisse, 1953, 56: 160-1, illus.
Descriptions with colour plates of 13 new roses.
b BEAUMONT, A.
Cyclamen diseases.
Gdnrs' Chron., 1953, 133: 240.
In Britain.
c BEAUMONT, A.
Diseases of privet.
Gdnrs' Chron., 1953, 134: 53.
In Britain.

- d BREMER, H.
Alternaria dianthicola Neergaard an Nellen. (*Alternaria dianthicola* on carnations.)
NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, 5: 75-6, bibl. 4, illus.
First record in Germany.
e CLAUSEN, R.-L.
Ravageurs du rosier et méthodes de lutte. (Diseases and pests of roses and their control.)
Rev. hort. Suisse, 1953, 56: 144-50, illus.
f COSTA, L.
La coltivazione del gladiolo nel Pistoiese e nel Pesciatino. (Gladiolus growing near Pistoia and Pescia.)
Riv. Ortoflorofruttic. ital., 1953, 37: 102-5.
g CREASEY, L. B.
The garden gladiolus: its origin and interesting history.
J. bot. Soc. S. Afr., reprinted in *N.Z. Gdnr*, 1953, 9: 453-9, illus.
h GUNCKEL, J. E., AND OTHERS.
Vegetative and floral morphology of irradiated and non-irradiated plants of *Tradescantia paludosa*.
Amer. J. Bot., 1953, 40: 317-32, bibl. 57, illus.
i JOHNSON, M. A.
Relationship in the Magnoliaceae as determined by the precipitin reaction.
Bull. Torrey bot. Cl., 1953, 80: 349-50, bibl. 11.
j LEROY, A.
Deux rosiers botaniques très décoratifs. (Two highly decorative rose species.)
Rev. hort. Suisse, 1953, 56: 151-3, illus.
Rosa lucens erecta and *R. russelliana*.
k MAMELI-CALVINO, E.
La bougainvillea è rigogliosa in Italia come in Brasile. (Bougainvillea is as luxuriant in Italy as in Brazil.)
Ital. agric., 1953, 90: 251-6, illus.
Species and varieties, biology, and culture.
l MINISTRY OF AGRICULTURE, LONDON.
Narcissus flies.
Adv. Leaflet. Minist. Agric. Lond. 183, revised 1953, pp. 4, illus.,
Merodon equestris, *Eumerus strigatus* and *E. tuberculatus*.
m MINISTRY OF AGRICULTURE, LONDON.
Chrysanthemum midge.
Adv. Leaflet. Minist. Agric. Lond. 286, revised 1953, pp. 4, illus.,
Diathraea chrysanthemi.
n MINISTRY OF AGRICULTURE, LONDON.
Commercial dahlia growing.
Adv. Leaflet. Minist. Agric. Lond. 406, 1953, pp. 6.
o MITCH, G. E.
Daffodil breeding in America.
Proc. Bulb Grs' short Course 1953, Tacoma, Wash., pp. 16-20.
A brief résumé.

- p DE MOL VAN OUD LOOSDRECHT, W. E.
Dreissigjährige Erfahrungen in Bezug auf Mutation und Modifikation durch Röntgenbestrahlung. (Thirty years' observations on mutation and modification induced by X-rays.) *Angew. Bot.*, 1953, 27: 24-7, bibl. 31.
A short account of the author's work on flower bulbs with a list of his publications.
- q NIWA, T.
On structure of the ovary and fertilization of the chrysanthemum.
J. Jap. Inst. Landscape Architects, 1952, 15 (3/4): 26-31, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1953, 2 (1951-1952), p. 5.
- r NORDSTRÖM, C. G., AND SWAIN, T.
Isolation of a benzylidenecoumaranone (aurone) from a yellow dahlia.
Chem. Ind. Lond., 1953, pp. 823-4, bibl. 8.
- s SAVONET, G.
Het gieten van cacteeën en succulenten. (The watering of cacti and succulents.) *Cult. Hand.*, 1953, 19: 412-16, illus.
- t SCHALT, W.
Die wirtschaftliche Lage des Zierpflanzenbaues in West-Berlin. (The economics of ornamental plant production in West Berlin.) *Festschr. tech. Univ. Berlin-Charlott.*, Abt. Gartenb., 1953, pp. 51-71.
- u SPRY, C.
Flower arrangement and display.
J. roy. Soc. Arts, 1952, 100: 814-24, illus.
- v SUSINI, E.
Le Araliacee ornamentali. (The araliaceous ornamentals.) *Riv. Ortoflorofruttic. ital.*, 1953, 37: 94-9, illus.
Aralia, *Fatsyhedera*, *Fatsia*, *Hedera*, *Oreopanax*, and *Panax*.
- w VINCE, D.
Use of artificial light on chrysanthemums. *Grower*, 1953, 40: 24-5, illus.
For another account see *H.A.*, 23: 3321.
- x WAGNER, D. L., AND HOLLEY, W. D.
Unusually high day temperatures cause carnation calyxes to split.
Colo. St. Flor. Ass. News, 1953, 2 (10): 8-10, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 95, p. 3.
- y WILLIAMS, W. T., AND BARRETT, F. A.
A simple "scoring" method for the estimation of stomatal starch in *Pelargonium*. *Physiol. Plant.*, 1953, 6: 226-33, bibl. 5, illus.
- z ZWICKY, H.
Plantanova. Le nouveau vase pour plantes d'appartement cultivées sur solution. (Plantanova, the new vase for house plants grown in nutrient solution.) *Rev. hort. Suisse*, 1953, 56: 165-7, illus.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocados.

(See also 4514, 4536, 4560f, 4734.)

4489. SHOJI, K., ARISUMI, T., AND NAKAYAMA, M.
Avocado types chosen for export.
Hawaii Fm Sci., 1953, 2 (1): 3, 6.

Tests were carried out with 3 groups of avocado varieties maturing in summer, autumn, and winter or spring respectively. Data on fruit characteristics, such as time of harvest, weight, % seed, % fat content, maximum storage life, etc., are tabulated. The best potential market for Hawaiian avocados on the mainland of the United States is from May to November.

4490. LE ROUX, J. C., AND ALLAN, P.
Splice grafting of avocado trees.
Fmg S. Afr., 1953, 28: 113-16, bibl. 6, illus.
The splice grafting method evolved by Beck in the U.S.A. [see *H.A.*, 18: 2144] was tested under South African conditions, with the modification that the plants were raised in a lath house and not in a hot-house. Preliminary trials had shown that removal of the seed coat improves the percentage of germination and reduces the average time taken from 117 to 60 days. The seeds of Mexican rootstocks were planted in a rich potting mixture in cylindrical containers made of sheets of damp course. The scion wood was taken from shoots of the previous growth flush, which was about

$\frac{1}{16}$ in. in diameter and had fairly plump buds of medium size. When the seedlings were $\frac{1}{4}$ in. thick—about 4 in. high—they were ready for grafting. An upwards-slanting cut, about $\frac{3}{4}$ in. long, was made through the stem about 3 in. above the soil. A similar slanting cut was made through a scion of the same thickness, containing one bud, and the cut surfaces were firmly tied in position. All shoots arising from the rootstock were removed regularly. The young grafted trees were kept in the lath house for 6-10 weeks after sprouting, until they had completed their first growth flush, and were then hardened off. Plants from seed planted in March, with the seedlings grafted in winter, were ready for transplanting in November or December. The damp course material was removed and the trees were planted comparatively high, in view of the low union. After planting out the trees were sheltered against sun and wind for at least 4 months until they became established.—Natal agric. Res. Inst.

4491. HALMA, F. F., AND GOODALL, G. E.
Chlorosis in avocado.
Calif. Agric., 1953, 7 (7): 3, 14, and 7 (8): 11, 13, illus.

In experimental plots in various parts of California avocados on Guatemalan rootstocks are much more susceptible than those on Mexican rootstocks to a type of chlorosis of unknown cause, characterized in severe cases by leaf burn, dieback and death. The fact that

chlorosis has not been observed to any great extent in commercial orchards may be due to the almost exclusive use of Mexican rootstocks. [See also *H.A.*, 22: 4214.]

4492. CROSS, G. F.

Avocado trunk rot.

Fmg S. Afr., 1953, 28: 210-11, bibl. 2, illus.

An avocado trunk rot (*Phytophthora cinnamomi*) has been observed in the Transvaal in markedly different climates during the past 3 years. It is active during the rainy summer months and dormant in winter and occurs mainly on trees over 10 years old. The first sign of attack is a water-soaked bark rot, generally about 2 in. in diameter and generally at or just above ground level. This soon becomes covered with a white powdery excrecence which later turns pink at the edges. During the first season spread is mainly upwards, other lesions appearing above the first; marked lateral spread does not occur until the second season. The internal symptoms are described and varieties known to be susceptible are listed. Tree surgery at an early stage markedly retards the disease. Experiments on control with methylene-blue injections show promise.—Citrus and subtrop. hort. Res. Stat., Nelspruit.

4493. EBELING, W., AND PENCE, R. J.

Avocado pests.

Circ. Calif. agric. Exp. Stat. 428, 1953, pp. 35, illus.

This well prepared circular provides information on the status and control of 35 pests or groups of pests infesting avocado pears in California. A summary of the economically important pests and their control is given in a detachable chart.

Carobs.

4494. JONES, D. K.

Carob (*Ceratonia siliqua*) culture in Cyprus.

[*Mim. Publ.*] *FAO* 1225, 1953, pp. 24, bibl. 16.

An account of carob tree growing in Cyprus, including its history, botany, soil and climatic requirements, propagation, uses, pests and diseases. Notes on the limited experimental work in progress, economics of production and chemical analyses of products are appended.

Citrus—general.

(See also 3862, 4376, 4734, 4743.)

4495. BESTBIER, N. A. B.

Variations in the organisation and management of citrus orchards.

Citrus Gr. 1953, No. 230, pp. 4-6, No. 231, pp. 3-5, No. 232, pp. 4-5.

The statistical information provided by 3 cost surveys in 1948-50 has been analysed to show the average cost of citrus production in the Union of South Africa and to determine some factors associated with efficiency. Topics discussed are differences in the organization and management of small and large orchards, planting distance and cost and yield per tree, relationship between production cost and yield per tree, cost and yield per tree and profits, income in relation to capital outlay and operator's earnings.

4496. NESTERENKO, G. A.

Trial of citrus cultivation in new regions.

[Russian.]

Sad i Ogorod, 1953, No. 3, pp. 54-61, illus.

Notes are given of experience gained during the past 4 years in growing citrus both in the open and under cover in new regions from Moldavia in Western Russia to Turkmenia in Central Asia. Points discussed include construction of trenches, winter cover of outdoor plants, planting distances, training and suitable rootstocks.

4497. REBOUR, H.

Les essais comparatifs de productivité en arboriculture fruitière. (Comparative yield trials in fruit growing.)

Ann. Inst. agric. Algérie, 1952, 7 (2): 1-48, illus.

The topics discussed in this paper on comparative yield trials, with special reference to citrus in North Africa, are the circumstances peculiar to fruit tree trials (environment, the plant, the plant-environment complex, financial considerations), coefficients of variation in production within individual trees and between trees, and the planning of trials (locality, planting material, number of trees and layout).

4498. N.S.W. DIVISION OF HORTICULTURE

Citrus industry.

A.R. N.S.W. Dep. Agric. 1951/1952, 1953, pp. 27-8.

Wastage. The Keepswell process (borax, boric acid and wax treatments) continues to give the best control of moulds; with Washington Navel and Valencia oranges green mould wastage was much lower with clipping than with fruit pulling. *Lemon storage.* A post-harvest dip of 500 p.p.m. of 2,4-D gave excellent control of stem-end rot during storage, especially in conjunction with pre-harvest applications of bordeaux mixture; a detergent bath followed by hot water washing reduced wastage in Washington Navels from 8 to 2.4%. *Citrus rootstock research.* Trifoliata improvement work included trials with Washington Navel on trifoliata and on trifoliata hybrids, and of scaly and non-scaly budwood of orange, grapefruit and lemon varieties. *Root development of trifoliata compared with rough lemon.* An investigation undertaken with reference to irrigation practices showed that rooting depths were comparable and that trifoliata had 50% more roots at each depth. *Pre-harvest drop.* 2,4-D gave good results with Washington Navel orange and Marsh grapefruit. *Harvesting maturity.* Lead arsenate had no effect when bordeaux had previously been applied.

Citrus—varieties, rootstocks and propagation.

4499. HU, C.

Some descriptive and taxonomic characters of citrus fruits grown at Riverside, California, and Szechuan, China.

Mem. Coll. Agric. nat. Taiwan Univ., 1953, 2 (5): 105-33, bibl. 15.

A description is given of the fruits of 10 citrus varieties growing in Szechuan. They include lemon, pummelo, sour and sweet orange, tangerine and Satsuma orange.

4500. CULAJA, V. I.

Lemon varieties for trench cultivation. [Russian.]

Sad i Ogorod, 1953, No. 4, pp. 29-32, illus.

Among the varieties discussed Meyer, Villafranca, Lisbon and Ljunarija are recommended for trench cultivation in Central Asia.

4501. JANAKI AMMAL, E. K.

A new interspecific citrus hybrid.

Curr. Sci., 1953, 22: 178-9, bibl. 1, illus.

Notes on a citron-malta lemon hybrid which the author found in a garden at Kausthubham, Shoranur, South Malabar. The fruit is intermediate in size between the parents, has the thick sweetish rind of the citron and is borne in bunches, commonly of 4 and 5.—*Bot. Survey India*, Calcutta.

4502. MAMPORIJA, F. D.

Vegetative hybridization of citrus. [Russian.]

Izv. Akad. Nauk S.S.S.R. Ser. biol., 1952, No. 6, pp. 49-61, illus.

During an examination of both vegetative and sexual progenies of various citrus chimaeras some of the sexual progeny of a periclinal chimaera between *Poncirus trifoliata* and *Citrus unshiu* showed a combination of the characters of both components.

4503. GIACOMETTI, D. C.

Problemas da escolha de cavalo para citrus. (The choice of citrus rootstocks.)

Bol. Agric. Minas Gerais, 1952, 1 (8): 3-18, bibl. 17, illus.

Notes are given on the citrus rootstocks most suitable for use in Minas Gerais, Brazil, to replace the tristeza-susceptible sour orange, Rangpur lime, Caipira orange, Cleopatra tangerine, rough lemon, *Poncirus trifoliata*, and citranges are considered.

4504. REBOUR, H.

Le choix d'un porte-greffe pour agrumes.

(Choice of a rootstock for citrus.)

Fruits et Prim., 1953, 23: 59-60.

Notes are given on recent studies on Cleopatra mandarin as a rootstock at Boufarik Experimental Station in Algeria. It should be tested widely in North Africa under different conditions.

4505. REBOUR, H.

Le greffage du Clémentinier sur *Poncirus*.

(Grafting the Clementine orange on *Poncirus*.)

Fruits et Prim., 1953, 23: 79.

Among citrus varieties in North Africa the Clementine does best on *Poncirus*. Some degree of incompatibility induces high yields through retarding sap circulation and the fruits are large and at least as early as on sour orange. There is sometimes marked dwarfing due to exocortis but the elimination of the disease by Clementine selection should be possible.

4506. ANON.

Progress report on stump grafting.

Calif. Citigr., 1953, 38: 271, illus.

Four years ago [see *H.A.*, 20:1906 and 21:967] 144 healthy, 75-year-old seedling orange trees of up to 2 ft. diameter were stump grafted with numerous scions each 2 ft. above the ground. The operation can now be

considered a success, as the trees are 8-10 ft. high and mostly compact, vigorous and comparable in size with 10-year-olds. In the first season suckers were permitted to grow and later were tipped. In the second season buds were inserted in well-placed suckers where scions had failed to grow. 60% of the scions made satisfactory growth. Special problems were control of sunburn, insect and rodent damage and protection from wind.

Citrus—growth phenomena.

4507. VAN DER MEULEN, A.

Flowering of six months' old citrus seedlings.

Fmg S. Afr., 1953, 28: 141, illus., and *Citrus Gr*, 1953, No. 235, p. 7.

In June 1952 seeds of Marsh and Foster grapefruit were planted in the open under a cover of glass. As soon as the seedlings emerged the cover was removed. The seedbeds were watered almost daily for the first 3 months. No abnormal conditions were noticed, either during the development of the original fruits or during the growth of the seedlings. During the first half of December about 5 out of 100 seedlings of both varieties produced a terminal flower, and one month later 10 and 5 further flowers respectively appeared on other Foster and Marsh seedlings. The flowers were perfect and Foster had a high percentage of apparently normal pollen, which however failed to germinate. [See also *H.A.*, 23: 1113.]

4508. SCHROEDER, C. A.

Spirality in citrus.

Bot. Gaz., 1953, 114: 350-2, bibl. 5, illus.

Studies are described from which it appears that spirality in citrus species differs from many other species in that considerable regularity of direction is observed. The direction of spirality alternates in regular sequence from one growth flush to another along a given branch and is not randomized as reported for most plant species.—*Univ. Calif., Los Angeles*.

Citrus—climatic factors.

(See also 3991.)

4509. TURRELL, F. M., AND BOYCE, A. M.

Effect of quality and intensity of solar radiation on injury of lemon fruit by sulphur treatment in the field.

Plant Physiol., 1953, 28: 151-76, bibl. 52, illus.

An account is given of a field experiment conducted at the University of California Citrus Experiment Station at Riverside in 1942 on Lisbon and Eureka lemon trees of 2-25 years old. It was designed to show the effect of reduction in intensity of total solar radiation and of reduction in ultraviolet intensity in solar radiation, on sunburn and sulphur burn of lemon fruit. Fruits exposed to direct solar radiation where there was no reduction of normal intensity were generally injured, although foliage showed very little injury whether treated with sulphur or not. Lime-sulphur caused the greatest percentage of sulphur burn. Elemental sulphur dust increased the percentage of burn from sun radiation. Reduction of total solar radiation reduced sunburn and sulphur burn, but elimination of the ultraviolet radia-

tion in the solar spectrum did not reduce either sunburn or sulphur burn. The ultraviolet filters behaved as heat traps. Higher percentages of sunburn and sulphur burn were found on south and top sides of trees than on other sides. No significant difference in susceptibility to sunburn or sulphur burn was found between large and small fruit or between yellow and green fruit. Likewise, no significant differences in burning occurred in the May and July hot periods. Sulphur treatment appeared to lower the temperature at which solar radiation injures lemons. Injurious fruit-peel temperatures are considered to be due to an unfavourable ratio of energy received to energy lost by fruit. In this experiment warm air was shown to be the primary factor interfering with heat dissipation by fruit. Effects of other meteorological factors are discussed.

4510. BROOKS, F. A., RHOADES, D. G., AND LEONARD, A. S.

Wind machines. 1953 report on frost protection tests in California citrus groves.
Calif. Agric., 1953, 7 (8): 6-7, illus.

Points are: 2 or 4 large machines (72 or 93 b.h.p.) running together gave a greater temperature response per machine than one alone; fans or propellers much larger than those now in use can be more economical since lower running charges offset higher initial cost; at present the best type of fan appears to be a 2-bladed sheet-metal one, the blades being rather narrow for their length, tapering moderately towards their tip, and having a low-cambered, low-drag airfoil section.

Citrus—cultivation and nutrition.

(See also 4560b, c, g, k, l.)

4511. GREACEN, E. L., AND PERKMAN, O.

Soil-structure changes in a long-term citrus experiment.
Aust. J. agric. Res., 1953, 4: 193-203, bibl. 13, illus.

Data are given on the changes induced in the physical properties of the soil [by the first 5 years of treatment] in a factorial experiment in which cultural, irrigation and N treatments are being tested on citrus. Apart from an increase in the non-capillary porosity of the surface layer to the depth of cultivation, there is no difference to be noted in porosity between the cultivated plots with the addition of organic matter and the uncultivated bare-surface plots where no organic matter is added. Under permanent sod the total non-capillary porosity is reduced but larger pores are present, 44% being in the form of insect burrows 2 mm. and more in diameter. The initial infiltration rates of the cultivated plots reflect the high porosity of the surface layer, but there is no difference in the final infiltration rates for these and the bare-surface plots. The infiltration rate of the sod plots is four times as high as in the other treatments, and is attributable to the effective hydraulic area of the faunal burrows. Cultivation has reduced aggregate stability as compared with uncultivated bare-surface and sod treatments, and the sod plots are considerably better in this respect than the bare-surface plots. This is not reflected in the soil organic carbon contents. Aggregate stability increases with increasing ammonium sulphate applications regardless of the cultural treatments. This is associated

with increasing soil acidity, which, incidentally, may influence structure through its effect on microflora and exchangeable cations. [Authors' summary.]—C.S.I.R.O. Griffith, N.S.W.

4512. JONES, W. W., AND CREE, C. B.

Fertilizer placement for citrus.
Calif. Citrogr., 1953, 38: 363.

Different treatments had no effect on production in a fertilizer placement experiment conducted at Riverside Citrus Experiment Station from 1933 to 1952. Fertilizer was applied at the row middle and under the skirt of the tree. Navel and Valencia oranges and grapefruit on sweet orange were employed.

4513. HARRIS, W. B.

Citrus manuring and soil acidity.
J. Agric. S. Aust., 1953, 56: 456-7.

Inorganic N fertilizers induce growth and cropping responses in the Murray irrigation areas and it is consequently the regular practice to apply large quantities of $(\text{NH}_4)_2\text{SO}_4$ annually. As this treatment might be supposed to induce soil acidity, tests were taken in a manurial trial at the Berri Experimental Orchard on a sandy soil overlying a clay loam. The trees had received nil to 5 cwt. $(\text{NH}_4)_2\text{SO}_4$ annually from 1920 to 1940 and nil to 10 cwt. from 1940 to 1952. While there has apparently been a slight decrease in alkalinity the samples with one exception showed an alkaline reaction (pH 7.2-8.67) and dangerous soil acidity conditions are therefore unlikely to develop.

4514. WALLACE, A., AND NORTH, C. P.

Lime-induced chlorosis. Chelating agents a possible means of control in citrus, avocado, and other subtropicals.
Calif. Agric., 1953, 7 (8): 10.

The chelating agent, EDTA (ethylene-diaminetetraacetic acid), is a possible means of controlling lime-induced Fe chlorosis in citrus and avocados. It holds Fe as a chelated complex in acid and neutral soils and to some extent in mildly alkaline and calcareous soils but causes burns on certain plants if large applications are made. Soil applications of EDTA, mostly in the glasshouse, have proved successful in correcting Fe deficiency in citrus, avocado, azalea, macadamia and *Leptospermum*. If lime-induced Fe chlorosis, of which the exact cause is not yet known, is due to a real Fe deficiency, Fe chelates can correct it by keeping Fe in a soluble form until absorbed by the plant. If, however, it is due to Fe inaction within the plant satisfactory control will only be possible if the EDTA-iron complex is absorbed and remains intact so as to facilitate Fe translocation.

4515. LEONARD, C. D., AND STEWART, I.
Fruit burn caused by chelated iron.

Citrus Mag., 1953, 15 (9): 19, 22, illus.

There have been cases of fruit burn and consequent fruit drop due to the use of Fe chelated with ethylene-diaminetetraacetic acid for the control of chlorosis. These have been chiefly on Valencia, and (in commercial groves) only when the chelate was mixed with fertilizer and applied with a fertilizer distributor. It is suggested that the chelate be applied (1) if possible, when there is no fruit on the tree, (2) only to severely affected trees, and (3) by hand, mixed with a diluent, to the ground below the trees.

Citrus—diseases and pests.

(See also 4560b, c, g, k, l.)

4516. OXENHAM, B. L., AND STURGESE, O. W.

*Citrus virus diseases in Queensland.**Qd agric. J.*, 1953, 76: 68-75.

Notes are given on the symptoms and transmission of 6 citrus virus diseases. Tentative recommendations for their prevention or mitigation are (1) stem pitting of grapefruit: use budwood which is virus-free or which carries a mild strain without ill effects to the mother tree; (2) psorosis or scaly bark: use virus-free budwood; (3) bud union decline: avoid sour orange as a rootstock and also grapefruit until further information is available; (4) scaly butt of trifoliata: do not bud lemon on trifoliata, and for Washington Navel and grapefruit use only virus-free strains; (5) mandarin decline: avoid rough lemon as a rootstock for Ellendale Beauty mandarin and treat it with suspicion for other mandarin varieties pending further investigations; (6) shellbark of lemons: avoid surgical treatment of affected trees and allow them to make temporary natural recovery.

4517. FEDORINČIK, N. S.

Controlling mal secco disease of citrus.

[Russian.]

Sad i Ogorod, 1953, No. 8, pp. 21-3.

To prevent the spread of mal secco [*Deuterophoma tracheiphila*] on citrus all diseased branches should be cut out. For early diagnosis a caroty red discoloration shown on the cut surface of infected wood combined with outward symptoms can be used. To improve the method a 20% solution of caustic soda can be used to enhance the reddish discoloration. By applying the method in the Batum area in 1952 the disease was for practical purposes eliminated.

4518. DI CARO, S.

Marciume dei rami degli agrumi da *Sclerotinia sclerotiorum* (Lib.) de By. (Branch rot in citrus caused by *Sclerotinia sclerotiorum*). [English summary 8 lines.] *Ann. Sper. agrar.*, 1953, 7: 395-9, bibl. 3, illus.

Two cases of *Sclerotinia sclerotiorum* branch rot were observed in damp localities in Catania province, one in lemon and the other in orange.—Lab. sper. Pat. veg., Bologna and Staz. sper. Fruttic. Agrumic., Acireale.

4519. DEAN, H. A.

*Long-horned beetles that attack citrus in the Lower Rio Grande Valley of Texas.**J. econ. Ent.*, 1953, 46: 174, bibl. 1, being *Tech. Art. Tex. agric. Exp. Stat.* 1629.

Wood boring insects found on citrus following a very severe freeze early in 1951 were usually confined to weakened trees in poor growing conditions.

4520. MARTIN, H.

*Observations on the Mediterranean fruit fly [*Ceratitis capitata*] on citrus in Tripolitania (Libya) in 1952/53.**FAO Plant Prot. Bull.*, 1953, 1: 132-6.

Attacks vary with location and variety, being worst in the coastal regions and in regularly irrigated areas, worse in the Demmi and Navel oranges than in the Portuguese orange but only developing severely in

grapefruits late in the season, from mid-December onwards. Among grapefruits Marsh Seedless proved less susceptible than Triumph or pummelo.

4521. FLESCNER, C. A.

*Some natural enemies of the citrus bud mite.**Calif. Citrogr.*, 1953, 38: 366-7, bibl. 3, illus.

Several species of mite prey on the citrus bud mite, *Aceria sheldoni*. These include several *Typhlodromus* spp., *Cheletogenes ornatus* and *Mediolata terminalis*, *Typhlodromus finlandicus* being the most important in south California. Field experiments are in progress to determine the rate of dispersal and of population increase of Typhlodromids in groves from which all insecticides have been withheld and to find means of hastening the re-establishment of satisfactory numbers of predatory mites. The Typhlodromids are also common and effective predators of the citrus red mite, *Paratetranychus citri*.—*Calif. Citrus Exp. Stat.*, Riverside.

4522. JEPSON, L. R., JESSER, M. J., AND COMPTON, J. O.

*Timing of treatments for control of citrus red mite on orange trees in coastal districts of California.**J. econ. Ent.*, 1953, 46: 10-14, bibl. 7.

Two treatments a year of either 12 oz. per 100 gal. of a 50% w.p. formulation of p-chlorophenyl p-chlorobenzene sulphonate (K-6451) plus 1 oz. of bis-(p-chlorophenoxy)-methane (K-1875), or 32 oz. per 100 gal. of a 40% w.p. formulation of K-1875 alone, or 43 oz. of a 15% w.p. formulation of 2-(p-tert-butylphenoxy) isopropyl-2-chloroethyl sulphite (Aramite), applied in March and September, resulted in adequate control of citrus red mite, *Metatetranychus citri*, for the entire year. Applications made at other times were less effective and a single application was insufficient to control the mite for a whole year. [From authors' summary. See also *H.A.*, 23: 1164.]

4523. LETTIERI, N., AND PICCIONE, R.

*Difesa degli agrumi con esteri fosforici.**(Protection of citrus with phosphoric esters.)**Riv. Ortoflorofruttic. ital.*, 1953, 37: 154-9.

In field trials near Salerno in 1951 on 12-year-old orange and mandarin trees control was obtained over *Toxoptera aurantiae*, *Pseudococcus citri*, *Coccus oleae*, *Chrysomphalus dictyospermi*, *Tapinoma nigerrimum*, and *Mytillococcus bekkii* with a 15% parathion spray applied at 0.4-0.5% at 5 l. per tree in the first week of September. The insecticide had no phytotoxic effect and a short-lived residual effect against useful insects (predatory ladybirds) but afforded prolonged protection against ants.

4524. EWART, W. H., AND ELMER, H. S.

*Effect of unarmored scales on citrus production.**Calif. Citrogr.*, 1953, 38: 352.

A method of evaluating relative yields has been used successfully during studies on the control of unarmored scales with new insecticides. Yield increases due to controlling infestations were found to be: *Coccus pseudomagnoliarum* on navel 13-75%, *Icerya purchasi* on navel 26-79%, *Coccus hesperidum* on navel 4-17% and on grapefruit 18-61%.

4525. BARTLETT, B. R.

Natural control of citricola scale in California.

J. econ. Ent., 1953, 46: 25-8, bibl. 3, being *Pap. Calif. Citrus Exp. Stat.* 737.

The combined action of the two most important parasites *Metaphycus luteolus* and *M. helvolus* is so effective at times against citricola scale, *Coccus pseudomagnoliarum*, in southern California that infestations appear only sporadically; but in central California, where *M. helvolus* does not occur, scale control is less satisfactory. The effect of certain insecticides on the parasites and the effectiveness of insectary-reared, liberated parasites are discussed.

4526. SPENCER, H., AND NORMAN, P. A.

Parathion for control of purple scale on early varieties of oranges.

Citrus Mag., 1953, 15 (9): 30-2.

Co-operative experiments were begun in Florida in 1949-50 to compare oil emulsion with parathion for the control of citrus purple scale (*Lepidosaphes beekii*) on early oranges (Hamlin and Parson Brown). 15% parathion applied at 2% with 5 lb. wettable sulphur added for the control of rust mite (*Phyllocoptura oleivora*) and emulsion sprays (a 90% cream-type concentrate applied at 1-25%) in June and August gave equally good control of heavy infestations. One application of parathion did not give all-the-year-round control but 2 1% sprays controlled moderately light infestations. Parathion was cheaper since it could be added to rust mite sprays, whereas oil emulsions cannot. Oil emulsion sprays applied in August retarded colouring and maturation, and parathion did not. Parathion residues were present in the peel at picking time but not in the juice. It is concluded that parathion sprays are preferable to oil emulsions.

4527. MUMA, M. H.

Lady beetle predators of citrus scale insects.

Citrus Mag., 1953, 15 (11): 24-5, illus.

This is the first of a series of papers on the common predators and parasites of citrus insects and mites in Florida. The 4 ladybirds which feed principally on the major citrus scales (purple scale, Florida red scale and cottony cushion scale) are *Rodolia cardinalis* (important on cottony cushion scale), *Chilocorus stigma*, *Micro-weisea coccidivora*, and *Exochomus marginipennis childreni* (important on red and purple scale).

4528. SUIT, R. F., AND DUCHARME, E. P.

The burrowing nematode and other parasitic nematodes in relation to spreading decline of citrus.

Citrus Mag., 1953, 15 (10): 22-4, bibl. 12, illus.

Citrus spreading decline, first observed in Florida in 1930, appears to be due to infestation of the feeder roots by the burrowing nematode *Radopholus similis*. The symptoms are stunting, few and small leaves, reduced yield, lack of feeder roots, but rarely death. In Florida it has so far been found on rough lemon, sour and sweet orange and grapefruit and it probably occurs on mandarin also. No definite recommendation for field control can yet be made but soil fumigation with D-D and removal of infected trees may be beneficial. Mention is also made of other parasitic nema-

todes associated with citrus feeder roots.—*Fla Citrus Exp. Stat.*, Lake Alfred.

Citrus—harvesting, packing and storage.

4529. BLONDEL, L.

Détermination du point de maturité des agrumes. (The determination of citrus maturity.)

Ann. Inst. agric. Algér., 1952 (issued 1953), 7 (4): 1-56, bibl. 38, illus.

An account is given of several years' research conducted at the Station Expérimentale d'Arboriculture at Boufarik with the object of discovering a practical method of determining degree of maturity in citrus. The conclusions drawn were that (1) the soluble solids: acids ratio is the most accurate test except for Thomson Navel, for which it displays wide variation, and for the Clementine for which acidity alone is a satisfactory test; (2) the minimum size of sample should be 40 fruits; (3) for analysis the whole of the juice of each fruit must be extracted since acidity and soluble solids vary in different parts of the fruit; (4) maturation is slower in storage than on the tree; refrigeration retards the process. Notes on determination of the soluble solids: acids ratio include details of juice extraction, clarification, analysis of soluble solids and sugars, and determination of acidity. Other topics discussed are the effect of the position of the fruit on the tree and the colour of the fruit.

4530. POWERS, J. B., GUNN, J. T., AND JACOB, F. C.

Electronic color sorting of fruits and vegetables.

Agric. Engng St. Joseph, Mich., 1953, 34: 149-54, 158, illus.

A successful experimental machine for sorting lemons colorimetrically into 4 classes, prior to storage, is described and illustrated. There was no significant difference in spoilage between the machine-sorted and hand-sorted fruit. The methods and apparatus embodied in the experimental design can be applied to sorting other fruits and vegetables.

4531. JOHNSON, D. B.

Marketing charges for oranges sold in Pittsburgh and Cleveland.

Marketing Res. Rep., U.S. Dep. Agric. 27, 1953, pp. 40.

Despite the U.S. citrus industry's efforts to stabilize growers' returns, abrupt price fluctuations within and between seasons continue. These are largely due rather to changes in retail prices than to changes in marketing charges, though the latter do alter gradually. The U.S.D.A. has undertaken to conduct studies of the marketing process and recommend improvements where possible. The study here reported covers only a part of the problem and concerns the marketing charges for oranges from California and Florida sold at two important centres.

4532. REBOUR, H.

Lutte contre les moisissures des agrumes. (Control of citrus moulds.)

Fruits et Prim., 1953, 23: 72.

Notes without data are given on experiments by I.F.A.C. on the control of moulds developing on citrus during transport. *Cold* delays fungal development, the period of evolution being 12 days at 8° C. and 28 at 2° C., but refrigeration throughout the journey is essential. *Borax* gives the best results, should be employed at a concentration of 10% (at a temperature of 45° C.), and must be applied less than 12 hours after harvesting as it is only effective against recent contamination; the fruit must not be rinsed after treatment. *Formalin* as an aerosol would be effective but damages the fruit if the concentration is too high; its use is recommended for the decontamination of collecting boxes. *Paraffin wax* gives protection against new infection. Waxes and borax are incompatible. *Synthetic resin sprays* are under test. They form an envelope which is water-tight but permits gaseous exchange.

4533. TOSCO, U.

Sulla penetrazione di *Penicillium digitatum* Sacc. e *Penicillium italicum* Wehmer nei frutti degli agrumi. (On the penetration of *Penicillium digitatum* and *P. italicum* into citrus fruits.) [English summary 7 lines.] *Nuovo G. bot. ital.*, 1951, 58: 441-9, bibl. 8, illus. [received 1953].

Inoculation experiments with a number of orange varieties under different conditions are described. These led to the following conclusions: (1) in both *Penicillium* species a high R.H. is required for spore germination; (2) the essential oil in the orange skin appears to inhibit mycelial development; (3) the juice of the pulp is the best medium for mould development as is demonstrated in fruits inoculated deeply, even when these are not held in humid conditions; (4) the deeper the inoculation the more rapid the infection (cuticle, epidermis and pericarp all being barriers against infection); (5) mould development is frequent in fruits in which the pericarp and mesocarp have been lacerated. Both species are both wound and contact parasites.

4534. DELLERÉ, R.

Résultats d'observations et d'expérimentations sur la biologie de deux fruticoles (*Penicillium digitatum* et *P. italicum*). (Results of observations and experiments on the biology of the two fruit moulds, *Penicillium digitatum* and *P. italicum*.) *Parasitica*, 1953, 9: 59-64, illus.

The chief conclusions drawn are that (1) *Penicillium italicum* develops more quickly than *P. digitatum* and is less sensitive to low temperatures; (2) the sporulation of *P. italicum* but not of *P. digitatum* is inhibited by the metabolic products of an infected orange; (3) an atmosphere rich in CO₂ greatly retards sporulation in both fungi, but darkness has no effect.

4535. TURK, A., AND MESSER, P. J.

Green lemon mold gas emanation products. *J. agric. Food Chem.*, 1953, 1: 264-8, bibl. 15.

Gaseous emanations from the common green lemon mould contain ethylene which stimulates respiration of healthy fruit. The effect can be controlled in store by purifying the storage air with bromine and activated carbon. Details of procedure are given. J.S.

4536. LINDGREN, D. L., AND SINCLAIR, W. B.

Effect of ethylene dibromide and ethylene chlorobromide fumigation on citrus and avocado fruits.

J. econ. Ent., 1953, 46: 7-10, bibl. 6, being

Pap. Calif. Citrus Exp. Stat. 745.

Results of extensive tests indicated that it is safe to use ethylene dibromide at 0.5 lb. per 1,000 cu. ft. at a minimum temperature of 70° F. for fumigation of California citrus and avocado fruits against the oriental fruit fly, *Dacus dorsalis*, and that ethylene chlorobromide is a promising fumigant. [From authors' conclusions. See also *H.A.*, 22: 2987.]

Dates.

(See also 4560h.)

4537. STOLLER, S., AND GOOR, A.

Date varieties in Israel. [Hebrew.]

Sifriath Hassadeh, 1953, pp. 52, bibl. 17, illus.

The history of date growing in Palestine throughout the ages is briefly discussed and illustrated descriptions are given of 29 date varieties. [From summary in English provided by A. Goor.]

Litchis.

(See also 4746.)

4538. STOREY, W. B., HAMILTON, R. A., AND NAKASONE, H. Y.

Groff—a new variety of lychee.

Circ. Hawaii agric. Exp. Stat. 39, 1953, pp. 8, bibl. 2, illus.

The new Groff variety originated as a seedling of the Chinese Hak Ip variety at the H.A.E.S. Poamohu Experimental Farm, Oahu. Its excellent fruit quality and tendency towards annual bearing suggest that it may become a leading commercial variety in Hawaii.

Olives.

(See also 3829, 3839, 4560j, m.)

4539. ANAGNOSTOPOULOS, P. T.

The history and origin of the olive tree. [Greek, with English summary 1 p.]

From *Proc. Acad. Athens* 1951, 26, 1952, 7 pp.

The author develops the theme that the olive originated in Crete, whence olive oil was exported to Egypt in 1500 B.C. according to a writing found in an Egyptian tomb. The wild olive has existed in Crete since before the Palaeolithic age and was in cultivation there between 3500 and 300 B.C. The tree was introduced to Egypt about 2000 B.C., but the climate did not suit it there. It was also introduced from Crete to Asia Minor, Palestine and continental Greece (1800 B.C.) where legend has it that Minerva planted it on the Acropolis. Thence it spread all over Greece and later through the agency of Greek colonists and Arabs to Sicily, Italy, France and Spain. In the nineteenth century it reached California, South America and Australia. The name "olive" is of Greek origin. It is a xerophytic plant thriving in a subtropical climate between the 32° and 45° northern and southern latitudes which includes the successful olive growing regions in North and South

America, South Africa and Australia, but not Egypt, latitude 20°, where the tropical environment unfavourably affects flowering and germination.

4540. MORT, C. H.

Olive varieties.

Agric. Gaz. N.S.W., 1953, 64: 227-8, 257-8, illus.

Olive variety collections were made at Wagga Agricultural College in 1895 and 1934, and pickling and oil-extracting tests have been conducted during the last few years. Recommended pickling and dual-purpose varieties are Manzanillo, Sevillano, Cucco, Mission (the outstanding dual-purpose variety) and Oblitza. The best oil varieties at Wagga are Mission, Corregiola, Bouquettier and Verdale; 9 others which should give good results are listed. Brief notes are also given on some 30 other varieties of pickling and oil olives.

4541. RENAUD, P.

L'olivier de confiserie dans le département de l'Hérault. (Table olive growing in Hérault.)

Ann. Éc. Agric. Montpellier, 1952, 29: 109-88, bibl. 27, illus.

After notes on climates and soils suitable for olive growing and on the distribution of table olive production in France in general and Hérault in particular a description is given of the four table olive varieties (Amellau, Lucques, Picholine and Verdale) grown in Hérault. Cultural methods (for pure and mixed crops and isolated trees), training and pruning, diseases and pests, fruit drop, harvesting, yield and sale are discussed. The method of renewal pruning employed for Verdale, a moderately vigorous small tree with a tendency to leaflessness in the lower crown of dense trees and very prone to flower drop, is described in some detail.

4542. BLOMMAERT, K. L. J.

The rooting of growth-substance treated olive cuttings.

Fmg S. Afr., 1953, 28: 137, 140, bibl. 2, illus.

Dipping the base of 4-6 in. long soft wood cuttings of the olive variety Mission in concentrated solutions of either indole-3-butyric acid (2 g./l.) or a combination of this acid and α -naphthylacetic acid (each at 0.5 g./l.) resulted in 14% and 34% rooting respectively, compared with 0% in untreated controls. Additional treatment with ammonium sulphate and sucrose did not have any beneficial effect. As the roots were found to develop invariably from a node, it is recommended that the cut be made just below a node. The use of a glass-covered propagating frame proved essential to provide the necessary conditions of shade and high humidity. It is hoped to improve rooting further in future tests involving different growth substance combinations and rooting media.—W. Prov. Fruit Res. Stat., Stellenbosch.

4543. CASTORINA, S.

Incisione anulare nell'innesto dell'olivo adulto. (Ringing in grafting adult olives.)

Olivicoltura, 1952, 10: 7-10, from abstr. in *Olearia*, 1952, 6: 374.

A new method of topworking adult olives avoids the disadvantages of crown grafting. The main branches are ringed at 8-10 cm. above the base, and below the

ring 2 scions are grafted. The advantages of the method are: (1) better take and more rapid development of scions; (2) gradual renewal of the crown and greater productivity of the old branches as a result of ringing; (3) avoidance of the topping required in crown grafting with greater benefit to vegetative equilibrium. The eventual removal of the ringed branch presents some difficulty owing to the presence of the 2 scions.

4544. ARMENISE, V.

Ciclo di accrescimento e differenziazione delle gemme in piante perenni nel territorio di Bari. VII. L'accrescimento di *Olea europaea* L. negli anni 1948-1949. (Growth cycle and bud differentiation in perennial plants in the Bari area. VII. The growth of *Olea europaea* in 1948 and 1949.) [English summary 1 p.]

Nuovo G. bot. ital., 1950, 57: 391-417, bibl. 11, illus. [received 1953].

Three olive trees in the Bari Botanical Institute were kept under observation in 1948 and 1949. Growth in trunk circumference took place in the spring of 1948 and 1949 and in the autumn of 1949, but not in the autumn of 1948, perhaps on account of the low rainfall during September-October; the spring growth season lasted from the beginning of April to the beginning of July and the autumn season from the beginning of October to mid-November. Extension growth varied in different parts of the crown; the main branches grew only once a year while some of the secondaries grew only in spring, some stopped growing almost at once in spring and then continued in autumn, and some grew either in spring or autumn. Notes are also given on wood development.—Univ. Bari.

4545. PALINI, A. M.

Osservazioni sul ritmo vegetativo di *Olea europaea* L. nel territorio di Camerino (Marche) nell'anno 1951. (Notes on growth in *Olea europaea* in the Camerino district of Marche in 1951.) [English summary 12 lines.]

Nuovo G. bot. ital., 1952, 59: 106-18, bibl. 3, illus.

In an olive tree in the Camerino district (670 m. elevation) in 1951 growth began in June-July and ended in November. There was a short pause in extension growth during August-September, but in girth expansion of the trunk there was no true summer dormancy period.

4546. BOUHÉLIER, —, AND OTHERS.

L'éclaircissage des olives. (Fruit-thinning olives.)

Fruits et Prim., 1953, 23: 54-6, bibl. 4.

Fruit thinning of table olives may be necessary to obtain large fruits, especially in varieties such as Ascolana Dura and Picholine du Languedoc which generally set abundant fruit. Thinning should occur fairly early in the season (July) before the lignification of the kernel, but a trial at Marrakech with Picholine has shown that removing $\frac{1}{3}$ - $\frac{1}{2}$ the crop as late as early October may result in a considerable increase in size and also advance the date of maturity. Late thinnings can sometimes be sold for preservation green. Hand thinning is impracticable when the fruits are very small

but hormone thinning can be done 15-20 days after full bloom. In hand thinning, the method of which is described, 7-10 fruits per m. of branch should be retained, even spacing being of no importance. American methods of hormone thinning are described.

4547. VERNET, A.

La productivité de l'olivier en Tunisie.
(The productivity of the olive tree in Tunisia.)

Oléagineux, 1953, 8: 433-40, bibl. 1, illus.

Tunisian olive oil yields are 1,200 kg. per ha. under irrigation equivalent to 800 mm. rainfall, 400-800 kg. under rainfall of 400-600 mm. per annum in the north, and 300 kg. in the Sfax area with a rainfall of 200 mm. Increasing the water supply increases the yield per ha. largely through making denser planting possible and results in the trees fruiting at an earlier age, unless density is excessive. By correct soil management, the use of large one-year-old rooted cuttings and some watering in the early years trees can be brought into bearing at 8 instead of at 11-12 years old.

4548. SOMMAINI, L.

Nuovi criteri di concimazione dell'olivo: la concimazione azotata ritardata. (New criteria for fertilizing olives: late nitrogen fertilizing.)

Ann. Stat. Chim.-Agrar. Roma Ser. III, 1951, No. 71, pp. 8, from abstr. in *Soils and Ferts*, 1952, 15, No. 1834.

Three-year field trials showed that late application (April) of 4-8 kg. of $\text{Ca}(\text{NO}_3)_2$ per tree increased the productivity of olives by greatly reducing the annual variations of crop yields that followed early (February) dressings.

4549. ANAGNOSTOPOULOS, P. T.

The influence of cement dust on the fruitfulness of olive trees. [Greek, with English summary $\frac{1}{2}$ p.]

From *Proc. Acad. Athens* 1950, 25, 1952, 2 pp.

The author attributes the unfruitfulness of olives growing near cement works at Eleusis in Greece to the dust emitted by the factories. The dust which is deposited on both sides of the leaves affects the physiology of the tree with bad effects on photosynthesis and causes abnormalities in the leaves, which become grey. The fine particles of dust not only interfere with the normal closing of the stomata and thus accentuate loss of moisture, but they may also interfere with the fertilization of the flowers during blossoming. Trees in consequence become unfruitful for a distance of up to 5 km. from the works and show not only loss of growth but also die back each year. He urges that factories should be compelled to prevent this spread of dust. He gives illustrations of affected trees in comparison with those in districts not so affected. [From author's summary.]

4550. FOGLIANI, G.

Ricerche sulla leptonecrosi dell'olivo. 2^a—Sintomatologia dell'alterazione negli olivi della zona del Garda. (Research on olive leptonecrosis. 2—Symptoms in the Garda district.)

Olearia, 1952, 6: 346-53, bibl. 5, illus.

Further notes are given on the new olive disease of

unknown origin reported in 1951 [see *H.A.*, 22: 2291]. Twenty-three different symptoms, their location on the tree and the sequence in which they appear are described. Etiology is to be discussed in a later paper.

4551. SAPONARO, A.

Presenza di *Gloeosporium olivarum* Alm. sugli organi vegetativi dell'olivo nel Leccese e nel Brindisino. (Presence of *Gloeosporium olivarum* in vegetative organs of the olive in the Lecce and Brindisi areas.)

[English summary 11 lines.]

Ann. Sper. agrar., 1953, 7: 609-19, bibl. 4, illus.

Branch and leaf abnormalities due to *Gloeosporium olivarum* are reported in southern Apulia. Laboratory experiments indicated that the attacks, which cause fruit drop and defoliation, are related to climatic and soil conditions. Recommended control measures are good drainage and spraying the areas of primary infection with bordeaux mixture.—Staz. Pat. veg., Roma.

4552. LUTRI, I.

La carie dell'olivo. (Olive canker.)

Giorn. agric., 1952, 62: 214, from abstr. in *Olearia*, 1952, 6: 316.

In a 75-year-old plantation at Ragusa there was a much higher percentage of olive canker (*Fomes lignosus* var. *oleae* and other fungi) in trees with the union more or less buried than in those in which it was above the soil (82% compared with 13%). The high incidence of canker is attributed to the lower resistance of the wood of the cultivated varieties.

4553. LOGOTHETIS, C.

The olive fly in the Mediterranean region.

FAO Plant Prot. Bull., 1953, 1: 118-20.

A summary is presented of existing knowledge on problems relating to the biology and control of *Dacus oleae*, and of the recommendations of a meeting convened by F.A.O. at Florence in March 1953 to discuss the subject. With present control methods annual olive fruit losses are estimated at over 25%; they are due to premature fruit drop, pulp destruction and consequent reduced oil yield, reduced market value of pickling olives, and increased oil acidity (from 1-2 up to 20%). A short account is given of the life history and ecology of the fly, and of present control measures. Problems considered at Florence were overwintering, and life history of the adult from emergence in spring to attack of new crop in mid-June. Co-ordination of study and control by interested Governments is proposed.

4554. PERETZ, I., AND PLAUT, N.

Control of olive fly in Israel.

FAO Plant Prot. Bull., 1953, 1: 101-3.

In Israel *Dacus oleae* causes severe losses especially among early pickling varieties of olive, such as Merhavia, Manzanillo, Ascollano and Sevillano. The control problem is not yet solved but promise is shown by (1) the modified Berlese bait spray method where an entire area can be treated on the basis of fluctuations in the fly population, and (2) cover-sprays of methoxy-chlor or dieldrin with or without sweetening material added as an attractant, where early varieties are involved or the treatment of a whole area is imprac-

ticable. In experiments with the former method an isolated plantation was sprayed with bait solution from under the trees in order thoroughly to cover the lower surfaces of the leaves at 500 c.c. per tree, treatments (6 in all between May and August) being applied at each rise in fly population as determined by trap counts every 5 days; all fruit was completely clean at harvest-time. In cover-spray experiments 90% clean fruit was obtained in one late and 2 early varieties with a methoxychlor spray at the rate of 20 l. (containing 50 g. active ingredient) per tree 4 times in June-August or a dieldrin spray at the same rate (containing 15 g. active ingredient) 3 times in June-July, each with 2% molasses. The molasses caused some fruit burn.

4555. ROMANO, E., AND GIULIMONDI, G.

Contributo allo studio della stabilità chimica della miscela dachicida Berlese. (A contribution to the study of the chemical stability of the Berlese mixture for control of the olive fly.) [English summary $\frac{1}{2}$ p.] *Ann. Sper. agrar.*, 1953, 7: 547-54.

The Berlese mixture employed in poison bait against *Dacus oleae* was found to retain its alkalinity (and hence its efficacy) for about 20 days under normal storage. This period could be extended to at least 75 days by adding the propyl ester of paraoxybenzoic acid.—Staz. chim.-agrar. sper., Roma.

Persimmons.

(See also 4620.)

4556. PASENKOV, A. K.

Methods of vegetative propagation of Japanese persimmon. [Russian.] *Sad i Ogorod*, 1953, No. 4, pp. 32-4.

Propagation of Japanese persimmon [*Diospyros kaki*] by budding gives only a low percentage take. In 1950 in the Batum and in 1951 in the Nikitski Botanic Gardens a method of rind grafting was tested and found considerably more satisfactory. In both cases the operations were carried out at the end of April-early May, using 2-year-old Caucasian persimmon [*D. lotus*] seedlings as rootstocks, and 1-year-old shoots of Japanese persimmon varieties, cut in February and kept in cold storage till required, as scions.

4557. BALDINI, E.

Ricerche sulla differenziazione delle gemme del kaki. (Studies in bud differentiation in kaki.) [English summary 7 lines.] *Ann. Sper. agrar.*, 1952, 7: 675-85, bibl. 16, illus.

Studies conducted in 1951 and 1952 in the variety "Kaki tipo" demonstrated that in the climatic conditions of the plain of Florence bud differentiation begins in early July. After the formation of the sepal and petal primordia development stops until February of the next year and is then continued. Anthesis generally takes place in mid-May.—Ist. Colt. arb. Univ., Firenze.

4558. SATO, K., AND ISHIHARA, M.

The amounts of the nutrient elements absorbed by Japanese persimmon trees. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1953, 22: 1-5, bibl. 2.

Data are presented on the dry matter content of old and new tissues in the stem, the 1-year-old shoots, the older branches, the leaves, the fruits and the fibrous and other roots respectively of a 9-year-old Japanese persimmon tree. The young shoots in the top of the tree contained the highest amounts of N, P_2O_5 and K_2O , and the fibrous roots had a higher NPK content than the older roots. The total amount of nutrients absorbed by 40 persimmon trees per tan ($=\frac{1}{2}$ acre) are calculated.—Tokai-Kinki agric. Exp. Stat.

Tung.

4559. HOLMES, R. L., MINOR, J. C., AND MCKINNEY, R. S.

The rate of development of acidity in stored tung seeds and kernels.

J. Amer. Oil Chem. Soc., 1953, 30 (4): 137-9, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 20647.

Whole tung seeds, whole kernels and chopped kernels of high, medium and low moisture contents in sealed cans were stored at 25°, 31° and 38° C. The development of free fatty acids in the oil of the whole seeds and whole kernels was little affected by temperature, but that of the chopped kernels was greatly increased by the higher temperatures. The experiments also showed that whole seeds with as much as 15% M.C. could probably be stored for several weeks without developing an objectionable amount of free fatty acids and that whole kernels developed even less; but that, while chopped kernels with M.C.s of 5% and 7% could be stored for 12 days without developing an acid value of more than 8%, those with a 12% M.C. developed a value of more than 8% in less than a week. Since commercial "hulled" nuts practically always contain some broken kernels they should be dried to 10% or less M.C. before storage.

Noted.

4560.

a AHMAD, S.

Some important nursery practices.

Punjab Fruit J., 1953, 25 (55): 13-14. For citrus.

b ALBA ROBAYO, V.

La "tristeza" de los citrus, grave amenaza para la industria citrica. (Tristeza, a serious menace to the citrus industry.)

Agric. trop. Bogotá, 1953, 9 (3): 41-5, bibl. 16, illus.

A short review.

c ANON.

Conselhos para a defesa sanitária das culturas. No. 2. As cochonilhas dos citrinos. (Recommendations for crop protection. No. 2. Scale insects on citrus.) (Publ.) *Minist. Econ., Lisbon*, 1952, pp. 4, illus.

d CAMP, A. F.

Trace elements in crop production.

J. agric. Food Chem., 1953, 1: 294-300. A discussion with special reference to Florida work on citrus.

- e CHAPMAN, H. D.
Soil and plant nutrition research with special reference to citrus.
Calif. Citrogr., 1953, 38: 270, 280-3.
A review of recent NPK studies.
- f FLESCNER, C. A.
A mite new to avocados.
Calif. Citrogr., 1953, 38: 364, bibl. 1.
Brevipalpus australis.
- g FLESCNER, C. A., AND RICKER, D. W.
An empidid fly predaceous on citrus red mites.
J. econ. Ent., 1953, 46: 155, bibl. 2.
Drapetis micropyga Mel.
- h GHAYUR, A.
Manuring of fruit trees in the Punjab.
Punjab Fruit J., 1953, 25 (55): 5-6, bibl. 7.
Notes on citrus, mango, date, grape, apple.
- i HAFIZ, A.
Chlorosis in citrus plants and its control.
Punjab Fruit J., 1953, 25 (55): 3-4.
Notes on Fe and Zn deficiency.
- HAUVILLE, A.
Variedades de olivos cultivados en Argelia.
(The varieties of olive cultivated in Algeria.)
Bol. Oleic. int., 1953, No. 13, pp. 3-8.
- k OBERHOLZER, P. C. J.
Degeneration of our citrus clones.
Fmg S. Afr., 1953, 28: 173-4.
Through virus diseases.
- l ROSEÑADA, M. F.
La enfermedad "tristeza" de los citricos, una seria amenaza para Cuba. (The tristeza disease of citrus, a serious menace to Cuba.)
Rev. Agric., Habana, 1953, 36 (1): 109-17, bibl. 16, illus.
A review article. The disease does not occur at present in Cuba.
- m SCARAMUZZI, F.
L'olivicultura negli Stati Uniti d'America. (Olive growing in the United States.)
Ital. agric., 1953, 90: 429-36, bibl. 35, illus.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 4219, 4734, 4743.)

4561. HENRARD, J. A.
Carte des productions vegetales du Congo belge. (Crops map of Belgian Congo.)
Publ. Dir. Agric. For. Élev., 1953, pp. 26, bibl. 17.

The map (1: 5,000,000) shows crops, areas of European colonization, the I.N.E.A.C. stations and the boundaries of the different vegetation type zones (according to Robyns' phytogeographical map). Plant product export statistics for 7 individual years between 1935 and 1952 inclusive are given.

4562. MALAYA DEPARTMENT OF AGRICULTURE (VOELCKER, O. J.).
Annual report of the Department of Agriculture for the years 1950 and 1951, 1953, pp. 71, 82.

This report includes information on: *Oil palm*: breeding and selection of dumpy, tenera and pisifera, and deli palms; germination; nutrition and soils, leaf analyses, pests and diseases. *Coconut*: selection and breeding; insect pests. *Pineapple*. *Cacao*: varietal trials, budding, cuttings, fermentation, pests and diseases. *Tea*: selection blight [see separate abstract], fermentation and Cu status. *Coffee*: varieties; diseases. *Fibres* (ramie and manila hemp): selection; diseases. *Spices* (cloves). *Vegetables*. *Miscellaneous fruits* (banana). *Derris*. *Soil investigations*. *Canning research*.

4563. VINK, A. P. A.
Mechanisatie in de bergcultures. 5. (Mechanization of highland plantation crops. 5.)
Bergcultures, 1953, 22: 147-53, illus.

A survey is given of some machines that have been tested and found satisfactory for use in the highland

plantations of Indonesia. They are dealt with under the headings American tractors, European tractors, soil cultivators, machines for grubbing trees, trailers and farm wagons.

4564. ANON.
Farm machinery. Light weight high-pressure sprayer.
World Crops, 1953, 5: 255.

A manufacturer's note is given of the Hydraulux Minor high-pressure sprayer designed for use in tea, coffee and banana plantations. It is intended to fill the gap between the small low-pressure outfit and the large high-pressure machine. Delivery is at 2 gal./min., and pressures up to 300 lb./sq. in. are obtainable. The pump is driven by a 1 h.p. 4-stroke air-cooled engine. Weight is under 1 cwt.

4565. RUINEN, J.
Epiphytosis. A second view on epiphytism.
Ann. bogor., 1953, 1: 101-58, bibl. 29, illus.

The results are presented of a preliminary investigation on why plants bearing epiphytes, such as ferns and orchids, decline in health. Epiphytosis, described as "the slow exhaustion of all partners of the biocoenosis one after another" was studied on a number of tropical trees. Two possible reasons for decline are postulated: (1) a substance pathogenic to the host may be produced by the epiphyte, in which case anatomical analysis would reveal pathological symptoms, or (2) the environment of the host may be modified physically as well as chemically. It is further shown that the mycorrhizal fungus of the epiphyte is potentially parasitic on the supporting tree, active parasitism depending on the constitution of the host.

4566. GARCÉS OREJUELA, C.
Plant pathology in Colombia.
FAO Plant Prot. Bull., 1953, 1: 97-100.

Includes a list of the more important diseases occurring

in Colombia on sugar cane, cacao, coconut, tobacco, bean (*Phaseolus vulgaris*), banana and plantain.

4567. NARAYANAN, E. S.

Fruit fly pests of orchards and kitchen gardens.

Indian Fmg, 1953, 3 (4): 8-11, 29-31, illus.

Notes on the Ethiopian fruit fly (*Dacus ciliatus ciliatus*) on cucurbits, the melon fly (*D. cucurbitae*) on cucurbits and other vegetables and fruits, the mango fruit fly (*D. ferrugineus*) on a wide variety of fruits and vegetables, the peach fruit fly (*D. zonatus*) on various fruits and vegetables, and the ber fruit fly (*Carpomyia vesuviana*). Recommended control measures are: deep burial of all infested fruit, removal of all undersized fruits from the plant, light ploughing after harvesting, trapping with citronella oil or proprietary attractants.

4568. LEONARD, E. R.

Some biological aspects of the overseas storage of tropical fruits.

Proc. 8th int. Congr. Refrig., Lond., 1951, 1953, pp. 647-52, from abstr. in *Food Sci. Abstr.*, 1953, 25, No. 1398.

West Indian grapefruit must be picked ripe, do not require a borax dip, and are best stored at 45° F.; they are subject to stem-end rot early in storage, to blue and green moulds during storage, and to anthracnose late in storage. Bananas are harvested at stages of maturity determined by the period of overseas transport, and require rapid cooling to 53° F. "Chilling" occurs below this temperature or if the appropriate time for the grade is exceeded; it is marked by differences in the final starch: hemicellulose ratio, which results in an unpalatable fruit. Mangoes must be picked at an appropriate stage of maturity determined by morphological development and can be stored at 48° to 50° F. for a short time only. Papaws show a close relationship between developmental maturity and ability to ripen. If they are harvested early, at a stage known to permit ripening, they fail to ripen after storage at 45° F. for a short time; at higher storage temperatures fungal wastage occurs.

Bananas.

(See also 4728e, 4750.)

4569. CHAMPION, J.

Note sur les densités et dispositifs de plantation du bananier nain. Un essai de la Station Centrale de l'I.F.A.C. (Guinée). (Notes on density and design in dwarf banana plantations. Experiments at I.F.A.C. Central Station (Guinea)).

Fruits d'Outre Mer, 1953, 8: 151-64.

Detailed descriptions and results are given of 2 planting density and design trials with dwarf bananas conducted at the I.F.A.C. Central Station at Kindia in French Guinea between 1948 and 1952. Densities ranged from 833 to 2,857 per ha. Designs consisted of square, rectangular and paired lines. The conclusions may be summarized as follows: (1) the mean yield per plant is the gauge of suitability of density; (2) a high mean yield exceeding 17-20 kg. shows that density can safely be increased provided it does not already exceed

2,700-3,000 plants/ha., figures which are reached only in exceptional circumstances; (3) close planting is desirable for the first and second harvest; (4) the best design is square.

4570. DEULLIN, R.

Le transport de la banane. (The shipment of bananas.)

Fruits d'Outre Mer, 1953, 8: 212-32, illus.

Notes are given on the following topics connected with banana shipment: (1) the fundamentals of shipment; (2) trade grades of banana; (3) degree of maturity at harvesting and the rate of ripening during shipment; (4) packing; (5) produce inspection at embarkation port; (6) technique of shipment; (7) factors influencing ripening of fruit; (8) transport in the plantation and to the port; (9) storage at embarkation and disembarkation ports; and (10) sea transport (loading, storage, ventilation, humidity and hold atmosphere). Improved techniques could make a delay of 4-5 days in harvesting possible with a consequent gain in weight of 5% and a greatly increased trade in bananas in the French Union.

4571. DEULLIN, R.

L'importance et le rôle de l'emballage dans le transport réfrigéré de la banane. (The importance and role of the package in the refrigerated transport of bananas.)

Rev. gén. Froid, 1953, No. 1, reprinted in *Fruits et Prim.*, 1953, 23: 115-22, illus.

Subjects discussed are the necessity for and objects of packing bananas, the attributes of a good package, protection from shocks, costs, the need for a minimum size and weight of package, method of loading into hold, heat and gas exchange, the effective surface of refrigeration, closed vs. open packages, handling, and type of package (rigid, Canary and Guinea).

4572. GANE, R.

Pilot plant experiments on the refrigerated gas-storage of Gros Michel bananas.

Trop. Agriculture Trin., 1952, 29: 150-5, bibl. 2.

Experiments in Jamaica showed that by employing ozone under gas storage conditions full $\frac{3}{4}$ grade fruit stowed as cargo could be held for 20 days (i.e. longer than the voyage period to U.K.) without any initiation of ripening, and could subsequently be ripened at 68° F. to good quality. Further study is necessary.—Food Invest. Org., D.S.I.R., Jamaica. [For a fuller account see *H.A.*, 23: 3522.]

4573. LEWY, M., SEVERN, V., AND CARBONELL, R.

Estudio sobre la digestibilidad de la pulpa de café y de la hoja de banano. (Study on the digestibility of coffee pulp and banana leaves.)

Café Salvador, 1951, No. 219, pp. 1619-24, from abstr. in *Bol. inf. Colombia*, 1953, 4 (40): 9.

Experiments with goats in San Salvador showed that in coffee pulp the coefficient of digestibility is low for proteins but high for crude fibre. In banana leaf the coefficients are generally high. Shade-dried banana leaf mixed with coffee pulp makes a palatable fodder.

Cacao.

(See also 4751, 4758.)

4574. URQUHART, D. H.

*Cocoa growing in the Fiji Islands.**Tech. Pap. S. Pacific Commiss.* 36, 1952, pp. 15, 2s.*Cocoa growing in Netherlands New Guinea.**Ibid.*, 37, 1953, pp. 9, 2s.*Cocoa growing in Western Samoa. (With a brief note on American Samoa and the Cook Islands.)**Ibid.*, 39, 1953, pp. 18, 2s.*Cocoa growing in the New Hebrides.**Ibid.*, 40, 1953, pp. 26, 2s.

The author was engaged by the South Pacific Commission to assess potential cacao production in some of its territories. These 4 reports are the result of visits paid by him in 1952 [see also *H.A.*, 22: 945, 946 and 1874]. *Fiji.* Cacao was introduced at the end of the nineteenth century and the condition of surviving trees suggests that they would have done well with normal attention. Suitable soils and climates exist and there are several hundred square miles in the Southern Division and on the south coast of Viti Levu where much cacao land may be found; there are additional areas on a number of islands including Vanua Levu, Taveuni, Kandavu, Koro and Ngau. Cacao would be a suitable crop for Fijian farmers and would fit in with their system of farming. Fiji should obtain planting material from Western Samoa. Notes on Fijian soils and on insect pests of cacao in Fiji and other South Pacific Islands are given in appendices by W. J. Blackie and B. A. O'Connor respectively.

Netherlands New Guinea. The low population and difficult terrain are obstacles in the way of agricultural development. As the climate everywhere in the lowlands excluding Merauke is suitable, cacao can be grown where the soils are suitable. A small number of hybrid Forastero-Criollo and Amelonado exist and much of this material appears to be basically good. The planting of a mild type resembling that of West Africa is recommended rather than any highly characteristic type. In selecting planting material the best local hybrids and introductions from Keravat should have preference to Amelonado (which the Netherland New Guinea authorities favour).

Western Samoa. Cacao was first introduced towards the end of the nineteenth century and is the second most important export crop (47% of the total value of all exports in 1951 compared with coconut products 48%). Land is available for further planting. The climate is suitable for cacao and the appearance of trees indicates that soil conditions are suitable. Pests and diseases are less prevalent than in most large-scale cacao-growing regions but the rose beetle (*Adoretus* spp.) does great damage to the leaves of young seedlings and *Phytophthora palmivora* destroys a considerable part of the crop each year. Samoa mainly grows Forastero-Criollo hybrids but it is doubtful whether she will continue to obtain the premium she has long received for "flavour" cacao. She should now employ planting material from selected local hybrids that tend towards Forastero in type and have mild flavour and high yield.

New Hebrides. In 1951 cacao was the second most valuable export crop (though very much inferior to

copra), but is not so important as it was. The sparseness and backwardness of the population are obstacles to development. Cacao is suitable for growing by natives and as a plantation crop. The climate is satisfactory and extensive areas of suitable soil are available on Santo and Efate for new plantings. Planting material should be selected from the best local trees. Existing types are Criollo-Forastero hybrids with Forastero predominating (G. Lodo in Appendix I). Appendix II by R. Dadant is on the phytopathology of the cacao tree in the New Hebrides. Appendix III is an extract on *Theobroma cacao* from a report by F. Cohic on an entomological survey made in the New Hebrides in 1949.

4575. FOWLER, R. L.

Características del cacao Nacional. (Characteristics of Nacional cacao.) [English abstract 8 lines.]*Turrialba*, 1952, 2: 161-5, bibl. 7, illus.

An account is given of the botanical relationships and characteristics of the growth, flowers and fruits of Nacional cacao, a type that is losing its popularity.

4576. RENDÓN ARAUJO, P.

Influencia de las estaciones y del estado de la estaca sobre el enraizamiento de estacas de cacao. (Effect of season and condition of cuttings on the rooting of cacao cuttings.) *Acta Agron. Palmira*, 1953, 3: 123-48, bibl. 14, illus.

Experiments at Colombia National University, Palmira, led to the following conclusions: (1) better rooting occurs in the dry season than during the rains; (2) cuttings from dormant trees root better than those from trees in active growth; (3) softwood cuttings root better than semi-hardwood or hardwood cuttings; (4) among softwood cuttings those without terminal buds root best; (5) cuttings from young trees root better than those from old; (6) cuttings with young leaves root better than those with old; (7) the better rooting of softwood cuttings from dormant trees is due to their higher content of biotin, auxins and nitrates.

4577. (BOWMAN, G. F., AND GARCÍA, F.)

*Bench grafting of cacao seedlings.**Cacao*, 1953, 2 (40-42): 2-3.

A rapid and successful method has been sought at the Inter-American Cacao Centre at Turrialba. The most promising technique gives 75% or more successful unions and 50% or more plants fit for planting out; a practised man can graft more than 100 plants per hour. 6- to 12-months-old seedlings, 1-3 cm. in diameter below the cotyledons, are topped just below the cotyledons. 2-4 bud scions are taken from mature wood of the last 2 flushes of young trees and the leaves removed immediately. The scion is wedge-grafted on the stock. No wrapping is required but the entire scion, graft area and split part are dipped in paraffin wax at 55-60° C. The plant is then planted in the nursery under shade and well watered.

4578. WASOWICZ, T.

*The effect of mulching on the status of major nutrients and the growth of cacao seedlings.**Trop. Agriculture Trin.*, 1952, 29: 163-9, bibl. 42.

A pot experiment with cacao seedlings grown in soil under various mulches is described. Considerable decrease of nitrogen content and increase of phosphorus and potassium in leaf tissues due to mulching have been observed. Similar observations have been made with regard to N, P and K content in percolates. Discussions of these phenomena are presented. Emphasis is laid on changes in the ecology of the surface soil layer, favourable to root growth, brought about by mulching. [Author's summary.]—*Imp. Coll. trop. Agric., Trinidad.*

4579. WASOWICZ, T.

Notes on the fertility of cacao soils. (a) Diminishing fertility of successive soil layers. (b) Effect of drying on soil fertility. *Trop. Agriculture Trin.*, 1952, 29: 156-62, bibl. 7, illus.

Pot experiments demonstrated the rapid decline in fertility of Trinidad soils with depth; fertility was almost negligible below 4 in. in a certain sandy loam and reached its minimum at a depth of 2 in. in a clay soil. The cacao seedlings grew much better in the clay (which had been thoroughly sun-dried before use) owing to its lumpy character which afforded free drainage and good aeration throughout the 5 months of the experiment despite daily watering. Applying this observation to field conditions, the beneficial effect of the dry season has been noted in many parts of the world. The author considers it is important to extend this effect as long as possible after the onset of the rains by such means as digging trenches at the beginning of the rains.—*Imp. Coll. trop. Agric., Trinidad.*

4580. MONTI, J.-R.

La périodicité des pluies au Mayumbe et leur relation avec la production de cacao. (Rainfall periodicity in Mayumbe and its relationship to cocoa yields.)

Bull. agric. Congo belge, 1953, 44: 493-510.

A study of the rainfall figures for Ganda-Sundi in Mayumbe for the period 1909-52 shows that high cacao yields are correlated with high rainfall. The relationship is often masked by the effect of non-climatic factors which will diminish as better cultural techniques are developed. The rainfall at Ganda-Sundi is somewhat low for cacao (1,403 mm. per annum) and not ideally distributed (there is a 2-months dry season), but these disadvantages are offset by the almost continual cloudiness during the dry season. There is a 4-year rainfall cycle, 2 dry years being followed by 2 wet.

4581. KNIGHT, R., AND ROGERS, H. H.

Sterility in *Theobroma cacao* L. *Nature*, 1953, 172: 164, bibl. 6.

A genetic hypothesis is advanced to explain sterility in a collection of self-sterile but partially cross-fertile upper Amazon cacao types introduced to the Gold Coast via Trinidad. A full account is to be published elsewhere.—*W. Afr. Cacao Res. Inst., Tafo.*

4582. SAPONISHKOVA, K.

Biochemical studies of Venezuelan cacao types.

From summary of paper submitted to *Cacao*, 1953, 2 (37/39): 3.

Studies at the National Institute of Agriculture of Venezuela included pod weight changes during develop-

ment, bean and shell ratios, the pH value of the pulp as an index of maturity, and chemical composition of the pulp, beans and shell at different stages of maturity.

4583. PAECH, K.

Über die "keimungshemmenden" Stoffe aus Früchten. (On germination inhibiting substances in fruits.)

Z. Naturforschung, 1949, 4b: 46-50, bibl. 12 [received May 1953].

In a study of cacao pods it was found that germination inhibiting substances are present only in the mucous layers of unripe seeds. Extracts of the mucus made at the later stages of seed development inhibited root growth in cress seedlings but not the germination of cacao or cress seed. Germination of cacao seed in the pod occurs only when the pericarp is attacked by mould fungi. Seed germination in healthy cacao pods was not prevented by inhibiting substances in the mucous layers but by other factors, possibly ethylene or lack of oxygen.—*Univ. Tübingen.*

4584. THOROLD, C. A.

Observations on fungicide control of witches' broom, black-pod and pink disease of *Theobroma cacao*.

Ann. appl. Biol., 1953, 40: 362-76, bibl. 23.

An account is given of experiments conducted in Trinidad and Nigeria to determine the control of 3 fungal diseases by relatively frequent applications of copper fungicides and to test modified procedures designed to reduce spraying costs. *Marasmius perniciosus* (witches' broom disease). A 1% bordeaux mixture spray applied only to the cropping regions reduced pod losses which may include effects of *Phytophthora* and *Diplodia* as well as of witches' broom. Monthly applications of 1% bordeaux reduced vegetative brooms and *Marasmius*-affected pods. *Corticium salmonicolor* (pink disease) was completely controlled by weekly or fortnightly applications of 1% bordeaux to the entire tree. *Phytophthora palmivora* (black pod disease). Satisfactory control was obtained by spraying the developing fruits with 1% carbide bordeaux (1 lb. CuSO₄, 6 oz. calcium carbide in 10 gal. water) at intervals of 1-4 weeks. Knapsack spraying failed to protect all pods more than 7 ft. from the ground.—*Dep. Agric., Nigeria.*

4585. NIGERIA.

Black pod disease of cocoa.

A.R. Nigeria agric. Dep. 1950-51, 1953, pp. 79-80.

Under weekly, fortnightly and 3-weekly spraying with 1% bordeaux mixture black pod (*Phytophthora palmivora*) losses were less than 10% compared with 70% in the controls, but control by spraying will only be economical on farms where the potential tree yield is relatively high. Mechanical control can be effected by removal and burial of infected pods, provided this is done daily.

4586. BARBOSA, M. R., AND SILVA, P.

O combate à "formiga de enxerto". (Control of the "enxerto" ant.)

Bol. Minist. Agric., Rio de J., 1947 (issued 1952), 36 (4/6): 106-9.

The "enxerto" ant [*Azteca paraensis* var. *bondari*] is a serious pest of cacao in Bahia, reducing production

and killing trees. In places infestation reaches the rate of one nest per 10 trees. It is claimed that, by systematic shaking down and burning of nests, 60 mobile teams eradicated the ant from 10,000 ha. between 1 January, 1944, and 30 June, 1946. Planters are advised to conduct half-yearly inspections after the visit of a team.—Div. tec.-agric. Inst. Cacau, Bahia.

4587. (HERNANDEZ S., A., PALMA, M., AND PEDRIQUE, A. R.)
 "Chinche" or "mosquilla del cacao"
 (*Monalonia dissimulatum*) in Venezuela.*
Cacao, 1953, 2 (37/39): 3.

Monalonia dissimulatum is found only in the Trincheras region of Venezuela and appears to attack cacao alone. Pods of all ages are attacked, but if they are at or near maturity when attacked the beans can still be used. Losses may amount to 75%. Agrocide, citro-emulsion and 2% mortegg gave almost equally good results in Venezuelan control experiments, but the last is preferred because it has no residual effect that could be detrimental to pollinators. All pods should be picked at the end of the dry season, and the trees should be lightly pruned to permit access of spray equipment. Periodical sprays to prevent the spread of the insect are recommended.

4588. CIFERRI, R., AND CIFERRI, F.
 Defectos y alteraciones del cacao en granos. (Defects in cacao beans.) [English summary ½ p.]
Mat. veget., 1953, 1: 148-66, bibl. 11.

The chief defects encountered in cacao beans in the Caribbean area, their cause and control are discussed. They include discoloration, malformation, germination, mouldiness, worminess, abnormal smell or texture, dampness. The commonest cause is incorrect fermentation. The characteristics of a well-fermented, high grade bean are listed.

Cinchona.

4589. EBES, K.
 Mechanical sorting of cinchona seeds.
Neth. J. agric. Sci., 1953, 1: 137-9, bibl. 1.

Tests have shown that the usual method of sorting cinchona seed by hand in transmitted light is unreliable. A machine constructed for winnowing the seed in a slow current of air proved quite satisfactory. A good correlation was obtained between number of seeds per gram and germination capacity of the winnowed seed. The cost of mechanical sorting was very much lower than that of hand sorting and the percentage of good seed to waste seed was considerably higher.—W. Java exp. Stat., Buitenzorg.

Cloves.

(See also 4751.)

4590. EAST AFRICA HIGH COMMISSION (NUTMAN, F. J., AND OTHERS).
 Clove Research Scheme, Zanzibar.
A.R. E. Afr. Agric. For. Res. Org. 1952, 1953, pp. 54-5.

Successful control, on a plantation scale, has been

* Being summary of a paper entitled "Presencia de la chinche o mosquilla o chupanga do cacao *Monalonia dissimulatum* Dist. en Venezuela y su control".

obtained of *Cryptosporella eugeniae*, the cause of dieback disease of clove trees. Experiments have been carried out to try to obtain unequivocal proof that the fungus *Valsa eugeniae* is the cause of sudden-death. It has been shown that there is a connexion between the sudden-death of old trees and the slow decline of young ones. The Clove Research Scheme is now to be terminated [and replaced by a long-range technological scheme controlled by the Zanzibar Government].

Coconuts.

(See also 4727i, k, 4728f.)

4591. SHANKER RAO, M. B., AND KOYAMU, K.
 Hybrid vigour in coconut seedlings.
Indian Coconut J., 1952, 6: 41-4, bibl. 4, illus.

Notes on hybrid vigour in one-year-old seedlings arising from tall (mother) × dwarf (father) hybrid nuts obtained by cross-pollination in 1949 and harvested in 1950.

4592. MENON, O. R.
 Vanamahotsava.
Bull. Indian centr. Coconut Cttee, 1953, 6: 214-20, illus.

A method is described whereby coconuts can be grown on dry sites without irrigation. On elevated lateritic areas the seedlings are planted at the bottom of pits 4 feet deep. The pits are gradually filled in during the first 4 years of the life of the tree, ample fertilizer being applied during this period. Shading is required in the first year. Notes are also given on planting mango, jack and cashew.

4593. MURRAY, D. B., AND LUCIE-SMITH, M. N.
 Estate fertiliser trials on coconuts in Trinidad.
Trop. Agriculture Trin., 1952, 29: 180-95, bibl. 6.

Five non-statistical fertilizer trials laid down with coconuts growing under estate conditions are described. A severe dry season overrides all fertilizer treatments and the fall in yield is proportional to the initial level of bearing of the trees. In two of the trials increased numbers of nuts were secured from applications of sulphate of ammonia. The response is proportional to the initial level of bearing of the tree, poor bearers showing a greater increase in yield than good bearers. Under such conditions different fertilizing should be practised, only poor yielders being treated in the first instance. No response was found to applications of potash or phosphate in the absence of nitrogen but trials would need to be run over several more years before definite conclusions could be drawn, particularly in regard to copra per nut. With normal yields of 80-100 nuts per tree, fertilizing with N, P and K gives no increase in yield, other factors probably being limiting. The difficulties involved in fertilizer trials with coconuts are summarized and the need for simpler alternative methods of assessing nutritional requirements discussed. [Authors' summary.]—Dep. Agric., Trin. Tob.

4594. SANKARASUBRAMONY, H., PANDALAI, K. M., AND MENON, K. P. V.
 On the nutritive contents of the leaf tissues of the coconut palm in health and in disease.
Indian Coconut J., 1952, 6: 7-18.

Foliar analysis of healthy coconut palms and palms suffering more or less severely from root disease showed that there is an accumulation of nutrients, particularly N, P and K, in the leaves of diseased trees. Further data are required before it can be determined whether this is due to impaired physiological processes or inadequate translocation.—Central Coconut Res. Stat., Kayangulam.

4595. VANDERPLANK, F. L.

Causes of coconut nutfall and gummosis.

Nature, 1953, 172: 315-16, bibl. 3.

This is a preliminary account of experiments which resulted in the successful control of several pests of coconut, each of which causes nut fall and/or gummosis of the nuts. The resistance of the coreid bug *Theraptus* sp., of the larvae of the weevil *Diocalandra frumentii* and of the moth *Lamoria* sp. to DDT was overcome by the addition to the mixture of coumarone resin, which rendered the formulations highly toxic and persistent. Foraging of the ant *Pheidole* sp. in palms was prevented by one application of 10% DDT (80% *para para*) with 1% coumarone indene resin dissolved in power kerosene. 10% dieldrex with the addition of 1% coumarone indene resin proved very satisfactory against the ant *Polyrhacis* sp. A fuller report will be published elsewhere.—Insect Research Scheme, Zanzibar.

4596. ANON.

De klappertor en de copra-productie in de Pacific. (The coconut beetle and copra production in the Pacific.)

Tijdschr. Nieuw-Guinea, 1953, 13 (5): 191-2, from abstr. in *Trop. Abstr.*, 1953, 8, No. 997.

The coconut beetle (*Brontispa frogatti*) is becoming a serious pest in the Pacific. It was probably introduced into Western Samoa from Ceylon. Control measures are being considered.

4597. VERGHESE, E. J., AND THOMAS, P. K.

A copra kiln for small coconut plantations.

Indian Coconut J., 1952, 6: 19-27, bibl. 11, illus.

The thatch-roofed kiln described is a 10-acre Malayan model modified to suit Indian conditions. It consists of a brick drying chamber (inside measurements 3 ft. 6 in. by 3 ft. 6 in. by 4 ft. 3 in.) with a fire tunnel at its base. Near the top of the chamber there are placed, one above the other, 4 split bamboo grills 3 ft. 3 in. square, each carrying 100 half nuts. Below them is a perforated iron heat-spreader. The drying time per load is about 30 hours when shells are used as fuel and 22½ with spathes. The outfit per 4-month kilning season (June-September) is about 5,000 processed nuts.

4598. NATHANAEL, W. R. N.

The history of vinegar production and the use of coconut toddy as a raw material.

Ceylon Coconut Quart., 1952, 3: 83-7, 135-49, bibl. 14, illus.

A description is given of the tapping technique and the method of manufacture of vinegar from toddy. Toddy yields vary considerably but average 50 gal. per tree per annum. The cane sugar content of the toddy averages 15%. Under favourable conditions every 10 gal. toddy fermented yields 8 gal. vinegar. The characteristics and chemical composition of the vinegar are given.

Coffee.

(See also 4573, 4727c, f, y.)

4599. URQUHART, D. H.

Coffee growing in New Caledonia.

Tech. Pap. S. Pacific Commiss. 38, 1953, pp. 21, 2s.

Coffee was the second most important crop in New Caledonia in 1951 and covered about two-thirds of the area of coconuts. It grows well and is capable of high yields; some of it is of high quality. It is a native crop. Both arabica and robusta are grown, the latter occupying the larger area. Large areas are available for expansion. Recommendations are: a soil survey of areas already cultivated and available for planting, the establishment of an experimental station, selection and breeding, and introduction of the wet method of processing (but the change from the dry to the wet method is not considered practicable in a supplementary comment by the French authorities). An appendix by P. Sarlan contains notes on the coffee industry in New Caledonia. [Appendix III to D. H. Urquhart's *Cocoa Growing in the Fiji Islands* (see abstract 4574) consists of notes by B. A. O'Connor on Insect Pests of Cocoa and Coffee in Fiji and other South Pacific Islands.]

4600. TANGANYIKA (SANDERS, F. R.).

Seventeenth Annual Report of the Coffee Research and Experimental Station, Lya-mungu, Moshi, 1950, 1953, Dar es Salaam, pp. 40, Shs. 2/-.

This report includes the following information: *Improvement of planting material.* Clonal and seedling selection trials continued. *Improvement of growing conditions.* The following treatments have been effective in increasing yield: (1) banana trash as mulch at 40 lb. per tree; (2) irrigation to make up rainfall to 2 in. monthly; (3) a combination of (1) and (2); (4) one 4-gal. petrol tin of compost per tree; (5) pruning on the multiple stem system as compared with the single stem system. *Bean measurements.* Bean samples taken from clones and seedlings of 9 parent trees in 1950 were compared for weight, volume and specific gravity. The differences in weight and volume were significantly in favour of seedlings in five cases and of clones in one, but the densities of clone and seedling beans were the same in all cases (except one apparently due to an error), suggesting that density is a genetic factor. Over 6 years there was a positive correlation between yield and bean weight. *Miscellaneous experiments.* Percentage germination of seed falls, and time taken to germinate increases, with age from harvesting; 7-week-old seed gave 95% germination in 10.1 weeks, 16-week-old seed gave the same percentage but in 11.6 weeks, and 25-week-old seed gave only 60% germination in 23.1 weeks.

4601. HAARER, A. E.

Robusta coffee.

World Crops, 1953, 5: 352-4, bibl. 4.

A short popular account of robusta coffee (*Coffea canephora*), its types, present and past habitat, its cultivation in Tanganyika and Uganda and its general demands as regards rainfall, soil and cultivation practice.

4602. ANON.

Debates sobre a cultura do café "mundo novo" em Ribeirão Preto. (A discussion on the growing of "Mundo novo" coffee at Ribeirão Preto.)

Fôlha de Manhã, reprinted in *Bol. Super.*

Serv. Café, S. Paulo, 1953, 28: 29-30.

Mundo novo (Urupês) coffee gives the best results in the old coffee areas of Araraquara. It is hardy and resistant to drought and pests. The yield is considerably higher than that of red or yellow bourbon, viz. Urupês 4·796 kg. per tree (average for 5 harvests); yellow bourbon 2·286 kg.; red bourbon 3·6 kg.

4603. ANON.

A semente de café. (Coffee seed.)

O Estado de S. Paulo, 5 July, 1952, reprinted in *Bol. Super. Serv. Café*, S. Paulo, 1953, 28: 27-8.

Sowing experiments at Ribeirão Preto Experimental Station led to the following conclusions: (1) the sowing of sun-dried beans is the least satisfactory method; selection is difficult and the germination percentage is low (maximum 57%); (2) the selection of fresh berries is also difficult and these also show low germination; their use involves sowing at an unsuitable season in years in which the fruit ripens early; (3) depulped fresh beans give as good results as depulped dry beans, but their use may also involve sowing at an unsuitable season; (4) the sowing of beans without the silverskin has no advantage over the sowing of dry depulped beans and necessitates one further operation, that of removing the parchment; (5) shade-dried depulped beans give the best results; germination is good, careful selection is possible and handling is easy. In experiments at the Instituto Agrônômica de Campinas, seed of different varieties showed 88% germination after 6 months and 8% after 12 months in an ordinary store, while seed kept in special containers under good conditions of temperature and humidity showed 78% germination after 20 months.

4604. COOLHAAS, C.

L'application de greffes de la branche dans la culture du caféier Robusta de Java.

(The use of branch grafting for robusta coffee in Java.) [English summary $\frac{1}{2}$ p.]

Neth. J. agric. Sci., 1953, 1: 130-6, bibl. 9, illus.

A summary is given of Indonesian work on the rejuvenation of robusta coffee trees by branch grafting and on the characters of whip and fan shoots. The work has previously only been published in Dutch [see *H.A.*, 9: 1401; 10: 1452; 18: 1406, 1464 l].

4605. LOUE, A.

Étude biochimique de la croissance du caféier. (Biochemical study of the growth of the coffee tree.)

Bull. Chamb. Agric. Indust. Côte d'Ivoire, 1953, 30: 28-46, from abstr. in *Trop. Abstr.*, 1953, 8, No. 1698.

The development, dry matter and N, P, K and Ca contents of plants grown in different nutrient solutions were studied. The amounts of N, P_2O_5 , K_2O and CaO absorbed, and from these the appropriate amounts of fertilizer, were calculated.

4606. MOWRY, H.

Minor element deficiencies in coffee in Costa Rica.

Foreign Agric., 1953, 17: 93-6, illus., reprinted in *World Crops*, 1953, 5: 455-6, illus.

Experiments begun in 1950 have shown that there are zinc, boron and manganese and probably other mineral deficiencies in coffee in Costa Rica. Zinc deficiency is widespread but varies in intensity. On several affected plants the leaves are abnormally small, sharply lanceolate, marked by a pale chlorotic pattern, and bunched at the nodes. Boron. Also found over a widespread area. Among its most prominent symptoms is the multiple branching—2 to 7 branchlets—of shoot terminals. A distinctive leaf chlorosis is also present. Many leaves are distorted and malformed. Manganese. This deficiency is less common. Symptoms are seasonal and progressive. Affected foliage is of a distinctive bronze or golden colour and generally is first visible in the crown. Remedies for all are afforded by soil or foliage sprays.

4607. GONZALES, C., AND CAMACHO, C.

Symptoms of boron deficiency in the coffee tree.

Tech. Bull. Costa Rica Minist. Agric. 11, 1952, from abstr. in *Agric. Lit. Refs Boron*, 1953, List 22, No. 49.

In many parts of Costa Rica coffee trees display B deficiency. Sour orange trees in the coffee zones also show symptoms; both green and ripe affected fruits contain a viscous or gelatinous brown mush round and inside the seeds; dark resinous spots occur in the albedo. Boron deficient coffee trees show abnormalities in the form, texture, and coloration of the leaves, the formation of cork-like growth over some of the veins of the leaves in the older foliage, and a fan-like growth of new leaflets on the ends of the stems. In plants which have produced their crop, a drying of the young stems and new growth has been observed. In a test begun in 1951 these symptoms were prevented by giving each plant, of 3 years of age or older, 4 oz. of borax. When the deficiency is not severe, it is suggested that 1 oz. of borax should be given per tree, each year, in two applications, at the beginning and at the end of the rainy season.

4608. RAYNER, R. W.

Rates and concentrations for "tonic" spraying.

Mon. Bull. Coffee Bd Kenya, 1953, 18: 394.

Hand spraying. Recent trials at the Coffee Research Station confirm the previous recommendation of a 2% Cu fungicide at 1 pt. per average-sized tree. *Mechanized spraying.* Preliminary conclusions from tests in progress on concentrations and rates of spraying are that: (1) increasing concentrations (in the range 0·25–2·0%) give increasing yields if the amount of spray fluid per tree is kept constant; (2) increasing the amount of spray fluid per tree decreases benefit from spraying if the amount of Cu per tree remains constant; (3) increasing spray fluid per tree increases yields if the concentration remains constant. For most practical purposes a 2% concentration is recommended. A table is published showing the rates of application for various types of coffee.

4609. HAVIS, J. R.

Daños en cafetos causados por herbicidas.

(Injury to coffee trees caused by herbicides.)

Turrialba, 1952, 2: 170-1, illus.

Observations are recorded on the damage caused to coffee trees by certain herbicides used in weed control trials at the Interamerican Institute of Agricultural Sciences, Turrialba. The herbicides were sprayed round the trees, not directly onto the foliage. The isopropylene ester of 2,4-D used in aqueous or oil solutions at the rate of 1 or 2 lb. per acre caused a curling of the leaves on the lower parts of the trees, while the upper parts remained unaffected. This suggests that injury was caused by accidental contact or volatilization. TCA at 30-50 lb. per acre caused severe chlorosis of the upper part of the tree and partial defoliation. CMU at 4-8 lb. per acre caused discoloured patches on the leaves of the upper half of the trees, followed by defoliation and death of the shoots. It is thought that TCA and CMU must have been translocated through the roots.

4610. GRANDALL, S. B., AND PATIÑO, B.

El mal de almácigos. (The nursery disease.)

Café Salvador, 1951, No. 232, pp. 187-9, from abstr. in Bol. inf. Colombia, 1953, 4 (40): 4.

Pellicularia filamentosa (= *Rhizoctonia* [*Corticium*] *solani*) causes a nursery disease of coffee which may develop before or after the seedlings reach the surface of the soil. The symptoms are depressions in the stem and dark spots. The presence of the disease may be suspected when the germination rate is low or isolated deaths occur. Soil humidity and alkalinity favour development. Fungicidal control measures are described.

4611. CASTAÑO, J. J.

Patogenia y epifitología en el estudio de la llaga macana del cafeto. (Pathology of [*Ceratostomella*] canker in the coffee tree.) Control de la llaga macana del cafeto. (Control of [*Ceratostomella*] canker in the coffee tree.)

Bol. inf. Colombia, 1953, 4 (39): 17-24, bibl. 3, and 4 (40): 17-22.

1. Notes are given on a canker in the coffee tree caused by *Ceratostomella* sp., a wound parasite that attacks the inner bark and phloem. The optimum conditions for the fungus are temperatures of 20-24° C., a humid atmosphere and a pH of 5.6-6.6.

2. The 2 varieties of *Coffea arabica* grown in Colombia, typica and bourbon, are equally susceptible. The fungus, which is very similar to *C. fimbriata*, can affect trees of all ages; it is chronic in mature or vigorous trees and subacute in young or weak trees. It is spread by rain (especially tornadoes), insects, infected vegetable matter, tools and man. 40% commercial formalin is an excellent eradicant and disinfectant. Infected tissue can be cut out successfully.

4612. MCC[RAE], D. J.

Colouring of dieldrin ant bands.

Mon. Bull. Coffee Bd Kenya, 1953, 18: 394.

Recent experiment at the Coffee Research Station show that methylene blue is suitable for the telltale colouring of dieldrin bands against the mealybug ant *Pheidole*

punctulata. Tentative recommendations for preparation are to dissolve 2 oz. methylene blue in 9 gal. cold water and add this solution to 1 gal. dieldrex 15.

4613. CALZA, R., AND SAUER, H. F. G.

A aranha vermelha dos cafezais. (Red spider on coffee.)

Biológico, 1952, 18: 201-8, bibl. 2, illus.

Paratetranychus ilicis, first observed in S. Paulo State in July 1950 in one locality, was reported from many parts of the State two years later and from several places in Parana State. Symptoms of attack are loss of lustre and bronzing of the leaves. Attack causes reduced yields. The life history of the mite is described. Leaf miner and mite attacks coincide and combined control can be achieved with BHC (1.5-2.0% γ -isomer) plus 0.4% parathion or 40% sulphur at 40 kg. per 1,000 trees applied as a spray.

4614. SWAIN, R. B.

Effect of benzene hexachloride on coffee flavour in Nicaragua.

J. econ. Ent., 1953, 46: 167, bibl. 1.

BHC dust applied for the control of the large grasshopper *Idiarthron atrispinum*, injuring the ripening fruit, imparted a "muddy" flavour to the coffee [see also H.A., 21: 3021].

4615. CHANDRASEKHARA, M. R., AND NARAYANA, B. T.

Quality and grading in coffee bean—relative merits of peaberry and "A" grade beans.

Sci. and Cult., 1953, 18: 592-3.

The result is given of a test in which various factors were compared in peaberry and grade A (the top trade grade) flat coffee beans from the 1945-46 harvest on an estate. The grade A beans had a higher specific gravity, ash content, percentage total solids and percentage increase in volume on roasting; there was little difference in colour, size and evenness; the grade A beans roasted better but in liquor valuation the peaberry gave a better cup. On total points there was no significant difference between the peas and the flats.—Centr. Food Tech. Res. Inst., Mysore and Div. Agric., Mysore.

Guavas.

(See also 3862, 4063.)

4616. BEAUMONT, J. H.

Guava variety selection started.

Hawaii Fm Sci., 1953, 2 (1): 7.

A collection of guava varieties and seedlings from many parts of the world has been planted on the Waimanalo Experimental Farm, with a view to selecting the most suitable types for production in Hawaii.

4617. VENKATAKRISHNIAH, N. S.

Glomerella psidii (Del.) Sheld. and [*Pestalotia psidii* Pat. associated with a cankerous disease of guava.

Proc. Indian Acad. Sci., Sect. B, 1952, 36: 129-34, bibl. 10, illus.

A canker or scab of guava fruits is a serious disease in Mysore. It is associated with either of the two fungi, *Glomerella* (*Colletotrichum*) *psidii* or *Pestalotia psidii*,

weak parasites, which were shown to infect only leaves and fruits injured by pinpricks. Under natural conditions the initial injury is probably caused by a *Helopeltis* species. In small-scale experiments 3-4 treatments with 1% bordeaux or with lime-sulphur, applied at intervals of 15 days from the beginning of fruit set onwards, were found to give satisfactory control. Leaf and fruit symptoms are illustrated.—Mysore Agric. Dep., Bangalore.

4618. MENEZES MARICONI, F. A.

Alguns percevejos das frutas. (Some plant bugs on fruit trees.)

Biológico, 1952, 18: 181-7, bibl. 7, illus.

In a study at Campinas 4 species of plant bug were observed to be attacking guava flower buds and fruits. *Leptoglossus gonagra*, *L. fasciatus* and *L. stigma* were common while *Holymenia clavigera* was rare. Notes are given on their distribution, economic importance, host plants, biology and the morphology of the adults. Methods of control are elimination of indigenous hosts and spraying with BHC.

Mangoes.

(See also 4728g.)

4619. MUKHERJEE, S. K.

The mango—its botany, cultivation, uses and future improvement, especially as observed in India.

Econ. Bot., 1953, 7: 130-62, bibl. 79, illus.

A comprehensive survey of the history of *Mangifera indica* as a cultivated tree in India is given and the genus *Mangifera* is described. The characteristics of many Indian varieties are detailed and climatic and soil conditions for optimum growth outlined. Methods of propagation are given in detail and orchard management is outlined. Analyses of fruit and pests and diseases are dealt with briefly, and programmes of future work on the improvement of mangoes are suggested.

4620. DRUMMOND, O. DE A., AND VILLANI, R.

Uma podridão da manga e do caqui em Belo Horizonte. (A rot of mango and kaki in Belo Horizonte.)

Bol. Agric. Minas Gerais, 1952, 1 (4): 25-7, illus.

A rot attacking the fruit of *Mangifera indica* (chiefly the varieties Roxa and Bahia) and of *Diospyros kaki* was studied at the Instituto Agrônômico de Minas Gerais. The name *Mucor flavens* is proposed for the causal fungus.

4621. KIRPAL SINGH, K., KAPUR, N. S., AND MATHUR, P. B.

Cold storage of "Totapuri" (Bangalore) mangoes.

Bull. centr. Food tech. Res. Inst. Mysore, 1953, 2: 149-51, bibl. 8.

Experiments showed that the optimum cold storage conditions for Totapuri mangoes are a temperature of 42-45° F. and a R.H. of 85-90%, the storage life being 7 weeks. Fruit thus stored can be ripened either at 67-70° F. or at room temperature (73-85° F.), but the former gives the better results.

Oil palms.

(See also 4728h, 4751.)

4622. WESTENBERG, M. G.

Normale en abnormale producenten bij Deli-dura-palmen. (Deli dura oil palms with normal and abnormal cropping capacity.) [English and Indonesian summaries $\frac{1}{2}$ p. each.]

Bergcultures, 1953, 22: 127-35.

A genetical explanation is given of the occurrence of a certain number of low yielding individuals, some of them showing malformations caused by crown disease, within a population of dura type oil palms.

4623. LOS, D. W. R., AND SMULDERS, W. L. A. Handbestuivingen in de oliepalm. (Hand pollination of oil palms.) [English and Indonesian summaries $\frac{1}{2}$ p. each.]

Bergcultures, 1953, 22: 161-7.

In Indonesia there is a need for large quantities of seed of the tenera type oil palms, obtained by crossing the dura and pisifera types. From experience gained on an estate on the east coast of Sumatra, the following advice is given concerning the technique of crossing. *The female inflorescence.* The number of pollinations should be limited to 2 per tree. The type of paper bag used for packing cement gave the best results as covering material; it should be treated with carbolic acid against ants. The best time to pollinate is when the lobes of the stigma are quite open and show a creamy colour, between 10 a.m. and noon. The bag should not be removed for 10-15 days after pollination to prevent second flowering. After 1-2 months the bunches are whitewashed to aid identification and to prevent attack by animals. The bunch is kept for 1 week after harvesting to facilitate removal of the fruits and pulp. The nuts are soaked in 1% hydrochloric acid, washed thoroughly and then soaked in water. *The male inflorescence.* The period between covering and harvesting the pollen should be 7-10 days. In cutting free the inflorescences, care should be taken that they remain vertical until harvested. The inflorescences should be harvested as soon as the top anthers begin to open, the best time being between 10 and 11 a.m. After gathering the pollen should be dried in the sun before final drying over unslaked lime.

4624. MANSVELT BECK, F. W. J., GIESBERGER, G., AND JACOBS, K. F.

Enkele ervaringen bij het tuinonderhoud met mechanische- en chemische hulpmiddelen. (Some experiences in [oil palm] plantation maintenance by mechanical and chemical means.) [English and Indonesian summaries 23 and 25 lines resp.]

Bergcultures, 1953, 22: 199-205, bibl. 2, illus.

Advice is given on maintaining a desirable weed cover in oil palm plantations in Indonesia. The eradication of sporadic patches ofalang by forking out at regular intervals proved to be more economical than spraying with sodium arsenite. The ground under the trees can best be kept free from weeds by spraying regularly, every 3-4 months, with a 0.2% aqueous solution of Cidico (2,4-D) or TCA. For control of the weed cover

between the rows, the use of weed rollers (the construction of which is described) has proved to be 4 times more economical than the usual method of slashing by hand. Even in neglected plantations where the ground cover has deteriorated into bushy undergrowth, such weed rollers drawn by a light type of crawler tractor can be used effectively and cheaply.

4625. MICHAUX, P.

Le rajeunissement des palmeraies. (The regeneration of oil palm plantations.)
Oléagineux, 1953, 8: 459-61.

The periodical regeneration of plantations is necessary because of the difficulty of climbing old oil palms to harvest the fruit. Notes are given on the replanting methods at present employed in the Far East, including fertilizer treatment.

4626. MELLIER, M.-T.

Les huiles de fibres de palme extraites à l'alcool. (Palm fibre oils extracted with alcohol.)
Oléagineux, 1953, 8: 371-4, bibl. 7, illus.

Notes are given on the alcohol-extraction of oil from palm kernel fibres. This oil is richer in carotene than expressed oil and loses carotene more slowly during storage. The dried, oil-free residue is rich in lignin, an important source of vanillin.

Papaws.

(See also 4025.)

4627. STOREY, W. B.

Genetics of the papaya.
J. Hered., 1953, 44: 70-8, bibl. 20, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* 264.

A review on the present status of work on the genetics, cytology and breeding of papaws is followed by notes on practical applications. Whereas in the past it was the practice in Hawaii to plant dioecious varieties producing about 50% useless ♂ trees, the present preference is for the pyriform fruits of ♀ trees of the Solo variety. As selfed ♂ trees yield only 2 ♂ to 1 ♀ it is common practice to plant 2 or 3 seedlings to a place, thinning to 1 tree per place as soon as sex can be determined. With 2 seedlings per place the proportion of ♀ trees may be reduced to 1 in 9, and with 3 seedlings to 1 in 27 in the final stand. Where dioecious varieties are still planted, setting 3 seedlings per place allows reduction of ♂ trees to about 12.5%, which is adequate for thorough pollination.

Pineapples.

(See also 4734.)

4628. RICHARDS, A. V.

Cultivation of pineapples.
Trop. Agriculturist, 1952, 108: 242-5.

Notes on pineapple cultivation in Ceylon. The 2 popular local varieties are Kew, a canning variety (almost identical with Smooth Cayenne) whose peak fruiting period is June-July, and Mauritius, a dessert variety that begins fruiting in February-March.

Rubber trees.

(See also 4727b, d, n, p, r, 4728a.)

4629. RUBBER CONFERENCE, BOGOR.

Report of the Conference of Rubber Research Institutes in the Far East, Agricultural Section, Bogor, July 1952.

Arch. Rubbercult., May 1953, Extra No., pp. 204, illus.

This report contains papers read at the Agricultural Section of the conference on the following subjects: physiology 8, botany 2, pests and diseases 6, agronomy 4 (2 on mechanization and 2 on fertility problems) and design of experiment (statistics) 2. Papers by Dutch and British authors are published in English, those by French authors in French. [Separate abstracts of several papers follow.]

4630. BURKILL, H. M.

Performance of clones and clonal seedling families in large-scale experiments on estates.

Arch. Rubbercult., May 1953, Extra No., pp. 107-16, bibl. 4.

About 15 years ago the Rubber Research Institute of Malaya began a programme of large-scale experiments throughout Malaya to test and compare 3 groups of material. Among the first group, which consists of older clones mostly dating from the early 1920s, only Tj.1 and P.B.86 are still in general use and unreservedly recommended for planting. Among the second group, which consists of 3 dozen seedling families, the outstanding ones are Tj.1 selfed seedlings and seedlings from the isolation Seed Gardens C, D and E (mixed seed) of Prang Besar Estate, from Batu Kawan Isolation Seed Garden and from R.R.I. Experiment Station Field 18. In the third group, which consists of the most promising clones produced by hand pollinations between a series of selected Malayan clones (the Pilmoor and Lunderston N clones) in 1928-31 and known as the R.R.I. "500" series, the 2 best are 501 (Pilmoor A.44 × Lunderston N) and 513 (Pilmoor B.16 × Pilmoor A.44). The new R.R.I. clones are greatly superior in yield to the 2 other groups.

4631. RUBBER RESEARCH INSTITUTE OF MALAYA.
R.R.I. "600" Series.

Plant. Bull. R.R.I.M., 1953, No. 7, pp. 72-8, illus.

Notes are given on the technique employed in preparing this series, and on the selection, parentage, yields and secondary characters of the clones R.R.I. 600-623, of which small supplies of budwood are now being released to estates for trial.

4632. BROOKSON, C. W.

The breeding and selection of *Hevea brasiliensis*.

Arch. Rubbercult., May 1953, Extra No., pp. 96-106, bibl. 8.

The breeding and selection of *Hevea brasiliensis* conducted at the Rubber Research Institute of Malaya has resulted in a significant depression of vigour due to inbreeding. The possible application of this point in obtaining heterosis is considered. Conferring disease resistance by crossing with *Dothidella*-resistant *Hevea benthamiana* is suggested.

4633. MUZIK, T. J.

Growth and regeneration in *Hevea* seedlings.*Science*, 1953, 117: 555-6, bibl. 4, illus.

A new method for the propagation of hevea cuttings from seedlings has been evolved with the object of providing material for the study of stock-scion relationships. The young stem is cut off at the age of 6 weeks and planted as a cutting. Removal of the stem stimulates the growth of buds in the axils of the cotyledons. Generally one bud sprouts in each axil. When the sprouts have reached a height of about 6 in. the taproot can be split, and thus 3 plants are obtained. Alternatively, the shoots from the axils of the cotyledons can be cut and rooted. The removal of these shoots induces new buds to grow, and the shoots arising from them may again be cut and rooted. Under greenhouse conditions, as many as 7 plants have been obtained from one seed by rooting successive cuttings in a damp chamber.—Federal Exp. Stat., Mayaguez, Puerto Rico.

4634. DE SILVA, C. A.

Planting and after care of budded stumps and stumped bud grafts.*Adv. Circ. Rubb. Res. Inst. Ceylon* 38, 1953, pp. 5, illus.

This circular does not differ in essentials from No. 8 [H.A., 14:1362] which it supersedes, but a more economical hole-digging method is recommended.

4635. CONSTABLE, D. H., AND HODNETT, G. E.

The manuring of *Hevea brasiliensis* at Dartonfield, Ceylon.*Emp. J. exp. Agric.*, 1953, 21: 130-6, bibl. 6.

A fertilizer trial on *Hevea brasiliensis* was laid down at Dartonfield, Ceylon, in 1938 to determine which of the main nutrients were required (a) to produce sufficient girth to permit tapping as early as possible and (b) to give the best subsequent annual yields. The 9 treatments (including compost) were arranged in 6 randomized blocks, each containing a different clone (Tj.1, P.H.183, W.259, H.C.28, P.B.86 and P.B.186) and each plot consisted of 16 trees surrounded by guard rows. An analysis of the girth and yield data obtained in the first 13 years is presented. With both girth and yield the principal response was to phosphate. The results do not indicate any appreciable interactions.

4636. CONSTABLE, D. H.

Manuring of rubber.*Adv. Circ. Rubb. Res. Inst. Ceylon* 37 (superseding 30), 1953, pp. 4.

A new manurial mixture, R 4:6:5, is tentatively recommended as preferable on most soils to the previously recommended R 215 and R 400. It consists of 100 lb. $(\text{NH}_4)_2\text{SO}_4$ (=20 lb. N), 100 lb. rock (Sapshos) phosphate (=30 lb. P_2O_5), and 50 lb. KCl (=25 lb. K_2O). The rates are 1 lb. per tree for the first year, 2-3 lb. for the second to sixth years, and 4 lb. from the seventh year onwards. At least 4 *pro rata* applications per annum are recommended and up to 8 for poor or unhealthy stands. The recommendation regarding frequent application applies whatever mixture is used, especially on sandy, well drained soil in the wet zone.

4637. OWEN, G.

Studies on the phosphate problem in Malayan soils.*J. Rubb. Res. Inst. Malaya*, 1953, 14: 121-32, bibl. 9, being *Commun.* 283.

An account is given of studies designed to discover the cause of the immobility of the phosphates in Malayan soils and the factors responsible for the low response of mature rubber trees to phosphate applications in soils known to be deficient in P. The inland soils (latosols), which are the important ones for rubber, generally contain negligible proportions of the most readily available forms of P; much of what is added is rapidly converted into inert forms and most of the rest is only available with difficulty. The coastal alluvial clay and clay loam soils generally contain sufficient available P, but sandy soils usually require additions; indications are that with both types an appreciable proportion of added phosphate remains in an available form.

4638. TIXIER, P., AND BEAUFILS, E. R.

Diagnostic foliare de l'hévéa: application à une expérience d'engrais en terre grise. (Foliar diagnosis of hevea in a manurial trial on grey soil.)*Arch. Rubbercult.*, May 1953, Extra No., pp. 70-8, bibl. 5.

In experiments at the Institut des Recherches sur le Caoutchouc en Indochine K fertilization generally resulted in a higher K content in the leaf, the response being apparently greater at the beginning of the growing season, when leaf K is normally higher, and caused increased yield. Foliar diagnosis of trees suffering from latex flow irregularities (partial drying, and coagulation) under K and NPK treatments appeared to show that these did not benefit from K treatment, and that they were deficient in Cu. These first results appear to emphasize the important and probably complex role of K in latex physiology, a role that deserves special consideration in countries like Indo-China, in which the dry season is very pronounced and the first rains do not fall until after leaf flush and flowering.

4639. COMPAGNON, P.

Observations faites à l'I.R.C.I. sur la variabilité du D.R.C. de latex d'*Hevea brasiliensis* et des rapports avec l'origine végétale et les conditions d'exploitation. (Observations made at the I.R.C.I. on the variability of the D.R.C. in *Hevea brasiliensis* and its relation to the origin of the plant material and the conditions of exploitation.)*Arch. Rubbercult.*, May 1953, Extra No., pp. 79-95, bibl. 10.

Observations made at the Institut des Recherches sur le Caoutchouc en Indochine for several years showed that: (1) D.R.C.s (dry rubber contents) of latex are highest at the beginning of the growing cycle at the end of the dry season, fall some time after the beginning of the rainy season and are lowest in the second half of the rainy season; (2) the considerable difference in D.R.C. between clones and seedling families at similar ages appear to be a genetic character; (3) no relationship exists between the D.R.C. and the productivity of clones or families; (4) D.R.C. increases with age;

(5) D.R.C. is lower with whole-spiral than with half-spiral tapping; (6) D.R.C. is higher at the top of the panel in any given tapping system; (7) D.R.C. is lower with higher planting density; and (8) D.R.C. is reduced by the application of fertilizer, especially K. The considerable fall in D.R.C. that can be caused by reducing the application of organic reserves or by injecting certain minerals suggests that variations may depend in given plant material on the proportion of these substances available to the laticiferous tissue. The differences in D.R.C. between clones and families are ascribed to differences in the behaviour of the laticiferous tissue. Increase in D.R.C. with age could arise from changes in the depth below the bark of the laticiferous layers, since those in the phloem are known to produce a more dilute latex than those near the surface. For each clone or family at a given age there is thought to exist a certain D.R.C. value which is an expression of optimum functioning.

4640. RUBBER RESEARCH INSTITUTE OF MALAYA.

Stimulation of yield of rubber trees.

Plant. Bull. R.R.I.M., 1953, No. 7, pp. 89-92, illus.

Experiments on yield stimulation with trees on the standard alternate daily half circumference tapping system have led to the following recommendations and conclusions: (1) CuSO_4 should not be used; (2) various 2,4-D preparations in palm oil have given large increases (20-30% increase over 18 months in the case of high-yielding material and 75% over 14 months in lower-yielding material); (3) stimulants should be used with caution on high-yielding material until long-term results are available.

4641. DE JONGE, P.

Stimulation of yield in *Hevea brasiliensis*.

Arch. Rubbercult., May 1953, *Extra No.*, pp. 7-26, bibl. 4, illus.

Experiments at the Rubber Research Institute of Malaya demonstrated that considerable yield increases can be obtained by treating trees with hormone-based mixtures or by injecting them with CuSO_4 , but it is not known how long these increases can be maintained by repeated treatment without some reaction. The hormone mixtures successfully employed were 2 proprietary compounds and 1% and 2% concentrations of the Na salts of 2,4-D and 2,4,5-T in a palm oil base applied on scraped bark below the tapping cut; trees on daily or slaughter tapping did not react well. CuSO_4 was effective with healthy, dried-up, and brown bast-affected trees and had a curative effect on brown bast (as had one proprietary). Generally speaking, the increases were largely due to a longer period of flow.

4642. COMPAGNON, P., AND TIXIER, P.

Sur la stimulation de la production d'*Hevea brasiliensis* par la méthode d'injection. (Yield stimulation in *Hevea brasiliensis* by the injection method.)

Arch. Rubbercult., May 1953, *Extra No.*, pp. 29-49, bibl. 12.

Experiments on a semi-commercial scale at the Institut des Recherches sur la Caoutchouc en Indochine have shown that CuSO_4 injections have in most cases a stimulating effect on latex production. Examples are given of increases of about 20% in the 12 months after

injection, and of 50% for the first 3 months in a low-yielding clone. Increases range from 6% to 65% with different clones. CuSO_4 injection often has a beneficial effect in the case of dried-up trees or those in which the latex coagulates in the tapping cut. The yield increases and change in dry rubber content are now thought to be due to an alteration in permeability of the cells and not, as was previously supposed, to the intervention of a Cu enzyme in latex metabolism. It is considered there would be no risk in injecting trees annually during the last 5 years of their life. Injection experiments with the following other substances are briefly mentioned: salts of Mn, Fe and K, boric acid, the Na salt of 2,4-D, and monoiodoacetic acid. [See also *H.A.*, 22: 4400 and 4402.]

4643. WIERSUM, L. K.

Results of some preliminary experiments on stimulation of latex yields.

Arch. Rubbercult., May 1953, *Extra No.*, pp. 27-8.

In small-scale experiments under the auspices of Centrale Proefstations Vereniging the following yield increases were obtained: bark scraping alone 30% in the first month, gradually diminishing; stimulex 50% in the first month, falling to normal in the fourth month; palm oil 17%, coumarin 10% in the first month, followed by no effect or a slight decrease; hormone 27% in the first month diminishing during the 2 following months; mulgofoon 20%; ammonia nil; sequestrene negligible; CuSO_4 paste 30% in the first month; CuSO_4 injection 25% in the first month, then declining quickly. Urea and lanolin gave decreases of 15% and 20% respectively. None of the treatments appeared to cause any appreciable change in the properties of the latex.

4644. BOUYCHOU, J. G.

La culture *in vitro* des tissus d'hévéa. (The culture *in vitro* of hevea tissues.)

Arch. Rubbercult., May 1953, *Extra No.*, pp. 50-3.

Notes on a method of culturing young hevea stem fragments and on the composition of 6-month-old callus tissue.—Institut Français du Caoutchouc, Paris.

4645. COMPAGNON, P., TIXIER, P., AND ROUJANSKY, G.

Contribution à l'étude des accidents physiologiques de saignée. (Contribution to the study of physiological abnormalities of the tapping panel.)

Arch. Rubbercult., May 1953, *Extra No.*, pp. 54-69, bibl. 7.

There are 5 different types of tapping panel abnormality: (1) abnormal colour, brownish spots, cracking of bark and finally necrosis and stoppage of flow (these being the typical symptoms of brown bast disease); (2) partial drying without browning or necrosis; (3) deformation; (4) coagulation of latex with little or no flow into the cup; and (5) complete drying without browning or necrosis. Under half-spiral alternate daily tapping, types (3) and (5) are rare and type (1) is commoner and occurs in the lower half spiral, the highest-yielding clones being the most susceptible, while types (2) and (4) are commonest on the upper half spiral, the clones most commonly affected being

generally different from those susceptible to brown bast. Predisposition to flow irregularities appears to be a genetic character. Irregularities are commonest in March after tapping stops, when leaf flush is taking place and the rains have not yet begun; in a fertilizer trial they were significantly fewer under NK, K and NPK treatments than in the control. CuSO_4 injections can reduce dryness and coagulation but not brown bast. The authors consider irregularities are due to mineral deficiencies, especially K and Cu, and that trees producing dilute latex are more liable than others to irregularities, especially if they produce a large amount.—Inst. Rech. Caoutchouc Indochine.

4646. SACCAS, A. M.

Les principales maladies cryptogamiques de l'hévéa en A.E.F. (The major fungal diseases of hevea in French Equatorial Africa.) *Agron. trop.*, 1953, 8: 176-98, 229-85, bibl. 110, illus.

The fungal diseases of hevea in French Equatorial Africa have been investigated since the war and 75 fungus species have been recorded. Forty-four of these (14 of them new to science) are described here. Notes are given on the symptoms and injuries they cause, their biology, and means of control.—Stat. centr., Boukoko.

4647. HUTCHISON, F. W.

Development of fungicides for the treatment of diseases of the tapping panel. *Arch. Rubbercult.*, May 1953, *Extra No.*, pp. 136-40.

The Rubber Research Institute of Malaya is the authority for testing materials submitted by manufacturers for inclusion in the "white list" of fungicides officially approved for the control (which is compulsory) of mouldy rot, *Ceratostomella fimbriata*. An account is given of the laboratory and field methods of testing fungicides, and of the promising groups of chemicals that have come to light during the tests. The outstanding discovery was the efficacy of the cationic detergents, tetradecyl pyridinium bromide (Fixanol V.R. which was eventually added to the approved list under the name Fylomac 90) and cetyl trimethyl ammonium bromide (Lissolamine A which was discarded because of its cost). The addition of 10% gentian violet to Fixanol V.R. was found to delay the rate of re-infection. This led to the examination of dyestuffs alone; brilliant green gave excellent laboratory results but poor field results. Two organo-mercurials under trial have shown promise *in vitro*.

4648. HILTON, R. N.

Studies in leaf diseases of hevea in the nursery and the plantation. *Arch. Rubbercult.*, May 1953, *Extra No.*, pp. 149-54.

Short notes on environmental studies in the field and pathogenicity studies in the laboratory on gloeosporium leaf disease (*G. alborubrum*), anthracnose (*Colletotrichum ficus*), colletotrichum leaf spot (*C. derridis*), powdery mildew (*Oidium heveae*), and bird's eye spot (*Helminthosporium heveae*). Among the conclusions drawn are that: (i) sun and shade plants differ so much in their anatomy and physiology that they constitute completely different organisms from the pathological point of view, apart from the direct effect that shade

has on the fungus; (ii) waterlogging of the soil induces a reaction in the plant which modifies the behaviour of the pathogen; (iii) age is of the greatest importance, and there is no disease common in its effects to nursery and mature trees; (iv) at least in the case of *Helminthosporium*, there appears to be an "immune reaction" to infection, so that there is depression of sporulation once the plant has undergone the stage of heavy sporing.—Rubb. Res. Inst. Malaya.

4649. HOEDT, T. G. E.

Opmerkingen over hevea-selectie in Z.O.—Azie en Latijns Amerika in verband met het optreden van *Dothidella ulei*. (Remarks on hevea selection in S.E. Asia and Latin America in connexion with the occurrence of *Dothidella ulei*.) [English summary and conclusions 6½ pp.] *Arch. Rubbercult.*, 1953, 30 (1): 1-37, bibls., illus.

Dothidella ulei, the South American leaf blight of rubber, has not yet occurred in S.E. Asia or Africa, but in Latin America it is so serious that until the last few years it has made hevea growing economically impossible there. With the increase in international air traffic the threat of invasion by *Dothidella* is becoming ever more serious. It is the aim of this article to stress the urgent need for protecting S.E. Asia against unexpected invasion and to suggest ways of safeguarding the rubber industry of the world. The technical possibilities of breeding and selection for resistance to leaf blight, and the breeding material and facilities available in different parts of the world are discussed. The rubber plantations of S.E. Asia and Africa consist exclusively of trees susceptible to *Dothidella*, and in the absence of the fungus resistant material cannot be raised and tested there. The solution suggested is the organization of international co-operation between all rubber-producing and rubber-consuming countries in order to utilize for selection and breeding all the hevea material and favourable local conditions available in the world. The international organization should also arrange for free, but controlled, exchange of planting material and exchange of information between countries.

4650. VAN HEUSDEN, W. C.

De Zuid-Amerikaanse bladziekte (*Dothidella ulei*), een brandende kwestie. (The South American leaf blight (*Dothidella ulei*), a burning question.) [English and Indonesian summaries ½ p. each.] *Bergcultures*, 1953, 22: 171-7, bibl. 9.

Recent measures taken to protect the rubber-producing areas of south-east Asia against the South American leaf blight are discussed. These include measures to prevent the introduction of the disease, measures to aid the recognition and control of the disease if it should occur, and selection with a view to establishing plantations resistant to leaf diseases.

4651. YOUNG, H. E.

Oidium problem of hevea. *Arch. Rubbercult.*, May 1953, *Extra No.*, pp. 127-31.

Notes are given on oidium control in Ceylon by sulphur dusting and on field scale trials with a new method. This consists of inducing defoliation with calcium

cyanamide prior to wintering, so that infective material on the trees may be shed and wintering may start earlier and more evenly with little infection present and under weather conditions relatively unfavourable to the fungus.—Rubb. Res. Inst. Ceylon.

4652. NEWSAM, A.

Some entomological problems in the culture of hevea.

Arch. Rubbercult., May 1953, *Extra No.*, pp. 141-8, bibl. 3.

Notes on *Coptotermes curvignathus* and their control by the standard method of applying a 1% solution of $HgCl_2$ round the base of the tree; cockchafers, damage from which has declined naturally since 1940, when it caused some alarm, and is now insignificant; and mites and thrips which are commonly met with but rarely troublesome.—Rubb. Res. Inst. Malaya.

4653. SPOON, W.

Latex cups van aluminium of van kunststof (plastiek). (Latex cups of aluminium or of synthetic material (plastic).) [English and Indonesian summaries $\frac{1}{2}$ p. each.]

Bergcultures, 1953, 22: 215-18, bibl. 17, being *Ber. Afd. trop. Prod. kon. Inst. Trop.* 239.

In Indonesia, where the latex cups are collected from the rubber plantations for cleaning in the factory, most of the cups are made of aluminium which is light and unbreakable. In Malaya where the cups are often left on the trees they may be made of earthenware. Cups have recently been manufactured from polystyrene, but they proved unsuitable for use in Indonesia as they were brittle and heavier than aluminium. It is suggested that cups of polyethylene or polyvinyl chloride might be suitable.

4654. RUBBER RESEARCH INSTITUTE OF MALAYA.

Bare back baling of sheet rubber.

Plant. Bull. R.R.I.M., 1953, No. 7, pp. 78-84.

Methods of minimizing distortion of bare back bales by careful initial stacking, and of massing (adhesion) by treatment of the bale wrapper sheets with talcum are described. Extracts from the Rubber Manufacturers' Association and the Rubber Trade Association of New York specifications for packing ribbed smoked sheet and for talcum powder and coating solution are quoted; it is recommended that packing should be in accordance with these. Reports on experimental consignments of small (75 lb.) bales were favourable except with regard to packing and handling costs and the present 224-250 lb. bale appears likely to remain in use.

4655. SEN, K. C.

Rubber seed kernel as cattle food.

Bull. Indian Rubb. Bd., 1952, 2: 36-7.

Preliminary trials at the Dairy Research Institute at Bangalore suggest that rubber seed kernel is not likely to make a suitable cattle feed unless a large part of its oil is extracted.

Sugar cane.

(See also 4727a, m, t, z, 4728c, i, 4434, 4754.)

4656. PEARSON, C. H. O.

Cane growing in Natal. Field methods and practices.

S. Afr. Sugar J., 1953, 37: 289-99.

This paper replaces Sherrard's "Sugarcane Agriculture for Beginners" [*H.A.*, 20: 3271] in the description of present-day Natal practices. The old ratoon crop is harvested in May and ploughing occurs at the first spring rains, a green manure crop (commonly sunn-hemp or velvet beans) being sown. Cane planting takes place generally in August-December along the contour unless the slope is very slight or furrow irrigation is contemplated. Rows are 4-6 ft. apart (generally 4 ft. 6 in.) and the common practice in planting is to leave a 9-12 in. gap between sett ends with a good germinating variety and otherwise to plant slightly overlapping. Setts are ordinarily 15-18 in. long with at least 3 buds. Thanks to trash-blanketing, weeding is only necessary in the plant cane crop. Harvesting takes place in most areas in May after 22-24 months' growth. Varieties suitable for various areas are Co. 301, Co. 331, N:Co. 310; new releases are N:Co. 339, N:Co. 293, N:Co. 334 and N:Co. 292. Notes are also given on trash-blanketing, manuring and irrigation.

4657. BARNES, A. C.

Cane sugar in East Africa.

World Crops, 1953, 5: 355-8.

Cane sugar production by modern methods in East Africa started in 1924 at Miwani, near Kisumu in Kenya. Production in 1951/52 amounted in Kenya to 14,300, Tanganyika 9,952 and Uganda 50,936 long tons. This falls short of demand by about 40,000 tons and despite present plans for expansion the shortage seems likely to increase. There would appear to be ample scope for future development.

4658. FERGUSON, H. S.

Sugar cane trials of the flood plains of the Bahr el Jebel in the Anglo-Egyptian Sudan. *Bull. Minist. Agric. Khartoum* 6, 1951, pp. 51, bibl. 20, P.T. 15 [received 1953].

The results are given of trial sugar cane plantings in the Bahr el Jebel flood plains (approximately 100 miles long by 5 miles wide) in the Anglo-Egyptian Sudan in 1941-45 and it is concluded that the area is suitable for cane growing. Soil, vegetation, topographical and hydrographical surveys and a large-scale pilot scheme would, however, be needed before a full-scale planting project could be established. Notes are given on the soil, climate and water relations of the area and on the maintenance of soil structure and fertility. The 4 varieties tried were P.O.J. 2725, P.O.J. 2878, Co. 419 and Co. 205. They yielded 20, 33, 33 and 40 tons cane per feddan (approx. 1 acre) respectively in the plant cane crop, and 35, 23, 29 and 18 respectively in the first ratoon.

4659. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.

Report of the Experiment Station Committee for the year ending Sept. 30, 1952, [1953?], pp. 77, illus.

The report includes information on: *Cultural practices* [see abstracts below]. Radioactive studies, mainly on N and P metabolism; nutritional studies; soil management studies. *Diseases*. Growth failure, stem galls, mosaic studies, *Pythium* root rot, varietal resistance, CMU and CMUCA tests, and the effect of fumigation on germination and growth. *Mechanization*. Self-propelled track-type infield transport unit, irrigated cane "cutter-only", cutter-bar and push rake combination, direct-mounted cane-harvester, unirrigated cane

"cutter-loader", side-mounted cutter-windrower, cane salvager, portable cane cleaner, rotary hoe. *Varieties*. Breeding, tasselling experiments, notes on varieties. *Weed control*. Tests with CMU, new CADEs, MCP, 2,4,5-T, SES and oils. *Miscellaneous*. Tomorin, a competitor of warfarin in rat control.

4660. GEORGE, L.

Sugar cane research at the Louisiana Agricultural Experiment Station.

Sugar J., 1953, 15 (10): 32-9, illus.

Notes are given on 1952 research. *Drainage*. Successful experiments are described (1) with flat cultivation designed to reduce drainage maintenance and cultivation costs, and (2) with grading (turtle backing) to improve drainage. *Weed control*. CMU and CUPC were not so efficacious as TCA plus 2,4-D in the control of Johnson grass in plant cane. Treatments are described in detail for the control of Johnson grass in plant cane and in stubble cane with TCA plus 2,4-D. *Fertilization experiments* showed that N is the most important element in sugar cane manuring and that under good growing conditions about 1 ton increase in cane yield can be expected from every 6 lb. N applied. Mg did not increase yields. *Insect studies*. Recommendations for cane borer dusting are: 1st generation—undiluted cryolite or 40% ryania at 10-12 lb./acre per application; 2nd and 3rd generation—40% ryania at 12-15 lb./acre; treatment against any generation is justified at a minimum of 360 stools showing leaf signs per acre or, for the 2nd, when 500 dead hearts are found. Biological control of the borer by *Trichogramma* is being tried.

4661. INDIAN CENTRAL SUGARCANE COMMITTEE.

Annual Report of the Sugarcane Research Scheme for Madras Province at Anakapalle Visakhapatnam district and Gudiyattam North Arcot district for 1949-50, [1951?], pp. 83 [received 1953].

Agronomy. Varietal trials, March/May planting trials, yield trials, manurial trials [see separate abstract below], swamp-planting varietal trial, harvesting date trial, irrigation experiment. *Chemistry*. N nutrition, ratoon biochemistry studies, juice composition and its effect on jaggery quality in relation to cane nutrition, juice analysis, estimation of C.C.S. without fibre estimation, composition of jaggeries from normal and swamp conditions, keeping quality of jaggeries from promising varieties. *Physiology*. Water requirements, pith formation, ratoon physiological studies, pre-treatment of setts, growth studies in monthly planting experiments. *Mycology*. Red rot, smut [see separate abstract below], mosaic, disease incidence in relation to agronomic factors. *Entomology*. Borers. [The 1948-49 report has also been seen.]

4662. MANGELSDORF, A. J.

Sugar cane breeding in Hawaii. Part II. 1921 to 1952.

Hawaii. Plant. Rec., 1953, 54: 101-37, illus.

Notes on breeding methods. It is believed that the next decade will see the disappearance of 32-8560 (which covered 35% of 1950 planting area) and 32-1063 (15%) and the expansion of 37-1933 (about 25%), 38-2915 and 44-3098.

4663. HASKEW, H. C.

Varietal trials—1952 season.

Cane Grs' quart. Bull., 1953, 16: 144-54.

The results are tabulated and discussed briefly for 18 variety trials. Several new seedlings and one introduced cane, N: Co. 310, compared well with standard varieties.

4664. LUGO-LÓPEZ, M. A., SAMUELS, G., AND MÉNDEZ, F.

Factors affecting the sucrose content of sugarcane: III. Varieties.

J. Agric. Univ. Puerto Rico, 1953, 37: 28-34, bibl. 2.

Data were obtained from 41 field experiments located throughout Puerto Rico. From the whole group of varieties tested, 20 were selected for evaluation of their sucrose production at harvest time. The data were grouped according to three broad climatic areas, namely humid, sub-humid, and semi-arid. Certain varieties were observed to produce better sucrose yields in a given climatic region, but in general there were no significant differences among climatic regions for most varieties. P.R.'s 908, 907, 902 and 905, M.'s 336 and 28, and C.A.'s 38-102 and 38-74 produced the highest sucrose yields at harvest time. The superiority in this respect of M.'s 336 and 28, and P.R.'s 907, 902 and 905 has been definitely established. Other promising varieties need further testing. Most of these canes yield more total sugar than the standard commercial P.O.J. 2878 and B.H. 10-12 canes, which cover more than 80% of the total sugar cane land in Puerto Rico. The important bearing of seasonal variation on sucrose content of varieties is discussed. Seasonal differences in the performance of individual varieties have proved to be much greater than differences encountered between varieties in the same season. [From authors' summary.]

4665. RAO, B. V., AND BHATTA, K. L.

Practical hints on sugarcane cultivation in Mysore.

Mysore agric. J., 1953, 29: 41-50.

Notes on site selection and preparation, planting, maintenance, irrigation, manuring, pests and diseases. Thick canes recommended for light and fertile soils are CO. 419, H.M. 320, Cheni No. 8 and I.C. 26; medium to thin canes for heavy soils and areas with restricted water supply are H.M. 661, I.C. 8 and H.M. 645. Other tested improved varieties are briefly mentioned.

4666. BUZACOTT, J. H.

Types of Badila.

Cane Grs' quart. Bull., 1953, 16: 159-65, bibl. 1, illus.

Badila, which has been grown in Queensland for 56 years and still accounts for about 16% of the acreage, has produced a number of sports. In a preliminary discourse on known variants established in a variety collection, the distinguishing characters are described of 6 types, most, if not all, of which are believed to be sports and not seedlings.

4667. BATES, G.

A mercurial dipping plant.

Cane Grs' quart. Bull., 1953, 16: 155-7, illus.

A description is given of a home-made unit which has

proved very satisfactory for cutting, dipping and bagging cane setts in a single operation.

4668. BRILLANTE, A. J.
Spacing-distance of furrow and hill experiment.

Sugar News, 1953, 29: 163-4.

In a spacing trial conducted by the Bogo-Medellin Milling Co. on the Canuta estate in the Philippines in 1950/51 and 1951/52, P.O.J. 2878 was planted at 3×1 ft. (33,330 per ha.), $3 \times 1\frac{1}{2}$ ft. (22,220), 4×1 ft. (26,664), and $4 \times 1\frac{1}{2}$ ft. (17,776). The highest yield in both the plant cane and the ratoon years was given by the closest spacing. In a trial with the same variety in 1949/50 the furrow interval was 1 m. and densities per ha. were 25,000, 30,000, 35,000 and 40,000. The 30,000 per ha. density gave the highest yield.

4669. REGE, R. D., AND PATWARDHAN, G. K.
Is intercropping possible in sugarcane culture—its effect on cane growth and yield.
Indian Fmg., 1953, 3 (1): 26-7, 31.

Experiments were conducted in 1950 and 1951 on plant cane of Co. 419 and Co. 475 to determine the effect of intercropping with maize. The cereal was planted at 1-, 2- and 3-foot intervals on the side of the cane ridges. In 1950 the intercropped cane received no extra fertilizer; in 1951 half of it received an additional 50 lb. N per acre at earthing up. Results were: (1) cane yields were depressed by maize intercropping, significantly so at the 1-foot spacing; (2) the extra N had a beneficial effect only in the case of the 3-foot spacing in which case yields were slightly greater than in the control; at the 2 closer spacings the additional yield did not repay the cost of additional manuring. It was concluded that intercropping with maize at 3-foot spacing with 50 lb. extra N per acre after harvesting the maize would give a slightly higher profit than the control.

4670. MUKERJI, B. K.
Some important findings of the sugarcane ratooning scheme at Kalai (Aligarh), Uttar Pradesh.
Indian J. agric. Sci., 1952 (issued Feb. 1953), 22: 267-70, bibl. 1.

The sugar cane ratooning scheme was conducted at the Kalai Government Seed Farm in Uttar Pradesh from 1939 to 1949 to determine the effects of different periods of ratooning on cane yield and quality, the effect of manuring on ratoon crops, the comparative economics of plant and ratoon crops, and the incidence of pests and diseases in ratoon crops of various ages. Co. 312, the standard local variety, was employed, and plant cane and first, second and third ratoon crops were taken. The crops received 100 lb. N per acre as sulphate of ammonia and castor cake in equal proportions. The first year ratoon gave almost as high yields as plant cane, gave better juice quality, reduced cultivation costs and was more profitable than the plant cane. The older ratoons gave lower yields and profits than plant cane. The incidence of top borer, white fly and stem borer was greater in ratoons but *Pyrilla* and termites tended to attack plant cane more. Well-cared-for ratoons do not necessarily augment pest trouble. It was concluded that ratooning for one year under average management, cultivation and maturing is to be recommended.

4671. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Cultural practices. [Soil management studies.]
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1952, pp. 17-23.

Various briefly described tests showed that (1) the most effective soil conditioner was trash or bagasse (10-15 tons per acre), bagasse making increased irrigation possible by improving the infiltration capacity of tight soils; (2) krillium gave no outstanding improvements in a wide range of soils in laboratory tests at 0.001-1.0% concentration and equally gave no significant responses in field tests at 100 to 2,000 lb. per acre; (3) extending the irrigation interval to wilting point depressed yield; (4) heavy mechanical equipment caused puddling and soil compaction which resulted in restriction of root systems and decline in cane and sugar yields.

4672. BONNET, J. A.
Soil-salinity studies as related to sugarcane growing in southwestern Puerto Rico.
J. Agric. Univ. Puerto Rico, 1953, 37: 103-13, bibl. 6.

Salinity due to seepage caused by impeded drainage and to surface-soil evaporation of salty irrigation water adversely affects the growth of sugar cane in certain areas of the Lajas valley, part of which is the subject of an ambitious irrigation scheme. Leaching tests showed that provided good drainage is provided (1) the excess of salts in saline (excessive salts) and saline-alkali (excessive salts and excessive exchangeable Na) soils can be leached out with fresh water; (2) the excess of salts in saline-alkali soils and the excess of Na in the saline-alkali and non-saline-alkaline soils can be leached out with gypsum or sulphur and fresh water, if the exchangeable Na does not exceed about 5 m.e. per 100 g. soil. Sugar cane grows poorly in salty lands containing from 0.75 to 2.00 p.p.m. of available boron, 0.53 to 1.19% sodium chloride, 20.0 to 72.9% extractable sodium, calcium-sodium ratios between 2.5 and 3.1, and with pH values of 8.3 to 9.2. Good sugar cane growth occurred when the salty land contained 4.5 to 11.4 of extractable sodium and the calcium-sodium ratios were between 12.0 and 19.4.

4673. CAREY, T. M., AND ROBINSON, P.
The manuring of sugar-cane.
Emp. J. exp. Agric., 1953, 21: 99-115, bibl. 3.

This paper contains a summary of the results of about 1,500 fertilizer experiments on sugar cane conducted in the West Indies, British Guiana, South Africa, Mauritius, India and Queensland between about 1900 and 1943. Constants for the response curves for N, P and K were determined. The means of the standardized responses of plant canes and ratoons to these plant nutrients are presented for the various territories. As might be expected, there is considerable variation in these responses from territory to territory, and for different soil types and climatic conditions within territories. There is little evidence of interaction between the different nutrients. Experiments comparing nitrate of soda and sulphate of ammonia showed little difference between the two forms. Experiments contrasting superphosphate with rock phosphate gave

variable results probably associated with the form of rock phosphate used. In most of the trials the dressings were repeated on each crop. It was found that in these circumstances the response of ratoons to N was about double that of plant canes but there was little difference in the responses to phosphate and K. The results of some experiments with pen manure, green manure, molasses and lime were also abstracted and examined.—Rothamsted exp. Stat.

4674. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Cultural practices. [Radioactive tracer studies.]
A.R. *Hawaiian Sugar Plant. Ass. Exp. Stat.* 1952, pp. 8-15.

N studies. Metabolism studies with heavy N showed that (1) new N moves rapidly from the roots to all parts of the plant, while old N is in continual circulation from primary stalks to suckers and back, and (2) whereas in N-rich plants new N goes chiefly to the roots and the internodes of the stalk, in N-deficient plants it goes chiefly to the basal joints and growing tip. Another experiment with leaf-sprayed heavy urea showed that the N mostly remains in the sprayed leaves. *P studies.* In available P-rich and P-deficient soils superphosphate generally gave double the response of ammonium phosphate. Surface-applied P is utilized under continuously wet conditions (under which the root system extends to the surface) but is little utilized under irrigation conditions. Experiments illustrated the importance of using setts rich in stored food since 85% of the phosphate in the setts was taken into the new plant. Leaf absorption studies showed that (1) about 19 days are required for the translocation of 65% of Rb 86 (a close relative of K whose radioactive form has a very short half-life) from the area of application and most of it goes to leaves above the treated leaf; and (2) over half the phosphate retained for 15 weeks remained in or on the sprayed leaves and about 45% was generally distributed about the plants. Studies were also conducted on the phosphates in intermediary metabolism.

4675. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Cultural practices. [Nutritional studies.]
Hawaiian Sugar Plant. Ass. Exp. Stat. 1952, pp. 15-17.

Experiments show that critical levels for exchangeable K, Ca and P are 75, 50 (tentative) and 20 p.p.m. respectively. Spectrographic analytical data of freckled and normal leaf sheaths show that freckled cane has an accumulation of K that cannot be utilized while Ca and Mg remain limiting factors. N, P and K foliar fertilization tests show that supplementary plant food thus applied is effectively used only when critical shortages exist.

4676. VALLANCE, L. G.
Soil fertility investigations. Results of the 1952 season.
Cane Grs' quart. Bull., 1953, 16: 135-43.

The results are summarized of 7 NPK trials, 17 lime trials in their second year (first ratoons) and 3 new lime trials on plant canes. The results, in general, show similar trends to those reported the previous year [see *H.A.*, 22: 4443].

4677. ANON.

Agronomy.

A.R. *Madras Sugarcane Res. Scheme* 1949-50, [1951?], pp. 6-18 (Anakapalle) and 68-77 (Gudiattam).

Ratoon experiment (Anakapalle), pp. 14-16. The object of the experiment, now in its third year, is to study the comparative effect of graded doses of nitrogenous and phosphatic manures ranging from 100 to 200 lb. N per acre plus nil to 100 lb. P per acre on the plant crop, first ratoon and second ratoon of Co. 419. Plant crop was significantly superior in yield to first and second ratoons. 150 and 200 lb. N tended to give more yield than 100 lb. P_2O_5 had no effect. *Study of optimum proportion of organic and inorganic N to cane (Anakapalle)*, pp. 17-18. Groundnut cake and ammonium sulphate in different combinations (ranging from 1:0 and 0:1 to 3:2 and 2:3 on N basis) were applied to determine the optimum proportion, but there were no significant differences in the yields. *Manurial experiment (Gudiattam)*, pp. 72-3. The application of 100 lb. P_2O_5 with 200 and 250 lb. N per acre did not significantly affect cane yield or jaggery quality. *Irrigation experiment (Gudiattam)*, pp. 74-5. In this experiment with Co. 419 and Co. 449, now in its 3rd and final year, 6-, 12- and 18-day irrigation intervals gave the same yield.

4678. LAL, K. N., AND SRINIVASAN, K.

Studies in crop physiology: effect of varying levels of farm yard manure, castor cake and sulphate of ammonia on growth, yield and quality of sugarcane.

Sci. and Cult., 1953, 18: 487.

An application of sulphate of ammonia at the rate of 120 lb. N per acre produced higher yields of cane and proved economically more profitable than did applications of farmyard manure or castor cake.—*Coll. Agric.*, Banaras Hindu Univ.

4679. CHINLOY, T., INNES, R. F., AND FINNEY, D. J.

An example of fractional replication in an experiment on sugar cane manuring.

J. agric. Sci., 1953, 43: 1-11, bibl. 8.

The design, analysis and results are given of a factorial experiment in sugar cane manuring in Worthy Park Estate in Jamaica. The experiment was designed to assess the nutritional requirements for satisfactory cane culture of a piece of apparently free-draining former pasture land in which a clay loam top soil overlies a heavy clay and it involved simultaneous experimentation with sulphate of ammonia, superphosphate, KCl, bagasse and filter press mud at nil, normal and double levels. The chief conclusions after a year were that: (1) N produced no response without P_2O_5 and a good response with adequate P_2O_5 ; (2) superphosphate and filter press mud were practically interchangeable as sources of P_2O_5 ; (3) bagasse appeared to act as a source of P_2O_5 ; and (4) no evidence was obtained that the double level of any fertilizer was superior to the single.

4680. CAPO, B. G., SAMUELS, G., AND BONNET, J. A.

Why foliar diagnosis?

Sugar J., 1953, 15 (12): 48-50, 80.

Experience on the use of foliar diagnosis as a guide to

NPK requirements of sugar cane in Puerto Rico suggests that it is more reliable than methods previously used. It was found that the relation between nutrient content and dry matter yield could be approximated closely by the equation $Y = A/B \arctan X$, where Y is the crop yield expressed as a percentage of the maximum yield obtainable with unlimited increases in the amount of the particular nutrient under study, A and B are constants, and X is the content of the given nutrient expressed as % dry matter of the plant. In general, this relation holds good for N, P and K contents of leaf-blade samples from the 3rd to the 6th leaf taken when the plants are 3 to 4 months old. However, certain problems remain to be solved. Thus with N, for example, the moisture content of the leaves affects the N content, expressed as % dry matter, without necessarily altering the relative nutrient status. More information is needed, too, on varietal differences in nutrient requirements and on the amounts of fertilizer needed for different soils to redress unfavourable balances.

4681. SAMUELS, G., CAPÓ, B. G., AND BANGDI-WALA, I. S.
The nitrogen content of sugarcane as influenced by moisture and age.
J. Agric. Univ. Puerto Rico, 1953, 37: 1-12, bibl. 10.

Experiments showed that: (1) the N content of the leaf sample varied from year to year despite constant cultural and fertilizer treatments; (2) a correction of N content for moisture eliminated most of the fluctuation of N in the leaf samples; (3) in most cases, leaf-sheath moisture and leaf-blade moisture gave the best correction for N variation, but rainfall variation could be used as a correction factor; (4) the N content of the leaf sample increased with increasing moisture content of the tissue; this increase was linear; (5) the N content of the leaf tissue decreased with increasing age of the cane plant; (6) the factors of moisture and age appear to be the most dominant in influencing the N content of the cane-leaf sample. [From authors' summary.]

4682. BOURNE, B. A., AND HUNDERTMARK, B. W.
Fertilizer trials with sugar cane on low mineral peat soil with special reference to copper oxide as a source of copper.
Sugar J., 1953, 16 (1): 26, 28-31, bibl. 5.

In an experiment on newly reclaimed, low mineral, peat land in Florida, plant cane received various combinations of superphosphate, sulphur, copper sulphate and copper oxide. All plots received uniform applications of K, Mn and Zn. Neither P nor S gave any favourable responses and high P significantly reduced the % yield of 96° sugar. Copper oxide (75% Cu) at 8.5 lb. per acre proved as satisfactory a soil amendment as copper sulphate (25% Cu) at 25 or 50 lb. per acre, and appeared to have an equally good residual effect on the first ratoon crop.

4683. LAL, K. N., AND SUBBA RAO, M. S.
Studies in crop physiology: interrelation between linear measurements on leaf, leaf area, leaf dry weight and plant dry weight.
Sci. and Cult., 1953, 18: 588-9, bibl. 1.

The authors previously described a rapid method of leaf area estimation in the Gramineae (including sugar

cane) by a formula based on the correlation between leaf area, length and width, leaf number and leaf factor. They now present methods of estimating leaf and plant dry weight by formulae based on the correlation between these factors and leaf linear measurements and area.—Coll. Agric., Hindu Univ., Banaras.

4684. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Varieties. [Control of flowering.]
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1952, pp. 48-9.

In lighting experiments a 10-day lighting period was sufficient to suppress flowers permanently whereas 3- and 5-day periods were not very effective; 1% and 3% maleic hydrazide caused reduction in flowers without measurable loss in stalk weight 6 months later; treatment of 37-1933 and 32-8560 with September-day-lengths in August and September designed to induce early flowering actually inhibited flowering; treatment of 7 non-flowering varieties and 37-1933 between 1 Sept. and 14 Oct. with normal, n- $\frac{1}{2}$, n-1, n-1 $\frac{1}{2}$, n-2 and n-2 $\frac{1}{2}$ hours day-lengths did not induce flowering in the non-flowering varieties and inhibited it in all except the normal day-length 39-1933 plants. Sensitivity to climate was further illustrated by the fact that heavy-flowering varieties flowered only in the normal Makiki climate and that flowering was completely inhibited by raising or lowering the night or day-and-night temperature.

4685. LUGO-LÓPEZ, M. A., SAMUELS, G., AND GRANT, R.
Failure of preharvest foliage sprays with 2,4-D and maleic hydrazide to affect the sucrose content of sugarcane.
J. Agric. Univ. Puerto Rico, 1953, 37: 44-51, bibl. 14.

In experiments to determine whether pre-harvest sprays of plant growth regulators would increase the final sucrose content of the cane, 2,4-D and maleic hydrazide at various rates were applied to P.O.J. 2878 and notes made of sucrose content at different dates up to harvesting. No significant differences were observed in the mean available 96° sugar % cane that could be ascribed to the treatments.

4686. SEN, S. C.
Suitability of one year standing crop [of sugar cane] for milling in the ensuing season.
J. Inst. Chem., India, 1951, 23: 135-41, from abstr. in *Brit. Abstr. B. III*, 1953, p. 687.

Juice quality of old, matured stalks in a standing crop deteriorated rapidly, and the stalks were unsuitable for milling. It is recommended that the new suckers which develop after the break of the monsoons be utilized. These compare favourably in juice quality with plant cane, and rate of absorption of plant nutrients is similar. Yields were 125 to 150 maunds (1 maund = 82.3 lb.) per acre.

4687. BUZACOTT, J. H.
Blind canes.
Cane Grs' quart. Bull., 1953, 16: 157-9, illus.

In certain varieties, notably Q.44, Oramboo and H.109, it is quite common to find nodes in top sections of stalks that have formed no eyes. Investigation has shown that the formation of blind nodes coincides with the period when the variety normally arrows.

Apart from avoiding the use of such sections in preparing setts the phenomenon is of little economic importance.

4688. MARTIN, F.

The running-out of sugar cane.

Industr. agric. alim., 1952, p. 15, from abstr.

in *Int. Sugar J.*, 1953, 55: 36.

The author draws his evidence largely from the incidence of sereh in Java and from the behaviour of Big Tanna in Réunion, and concludes that running-out is the consequence of using immature tops in planting. In both countries there are areas where tops alone are planted and others where only mature sections of the stem are used, and the phenomenon of running-out is limited to the former. He suggests that the progressive reduction of N, P and K in dry weight of the leaf with age, with a corresponding increase of Ca and perhaps other minerals, offers evidence of changes in mineral constitution between immature and mature tissues corresponding to the carbohydrate changes from glucose to sucrose in the cane and from sugar to starch in the potato.

4689. LANDRAU, P., JR., AND ADSUAR, J.

Effect of chlorotic streak on the yield of sugarcane.

J. Agric. Univ. Puerto Rico, 1953, 37: 19-27,

bibl. 9, illus.

A field experiment was carried out at Río Piedras to determine the extent to which sugar cane yields are reduced by chlorotic streak. Results were compared following the use of (a) infected setts, (b) non-infected setts, (c) infected-treated setts, (d) non-infected-treated setts. Cane developed from non-infected setts produced significantly higher yields than that developed from infected stock. Immersion in hot water (52° C. for 20 minutes) significantly reduced the incidence of the disease and increased the yields of cane and of sugar. An increase of about 45% in sugar production was obtained by planting non-infected healthy setts instead of infected non-treated setts. The proper selection of good setts free from infection with chlorotic streak will give higher yields of cane without the expense of treatment to control the infection. [From authors' summary.]

4690. GONZÁLEZ RÍOS, P., AND ADSUAR, J.

Effect of mosaic on the yield of sugarcane variety B.34-104.

J. Agric. Univ. Puerto Rico, 1953, 37: 13-18.

Experiments with the popular but susceptible B. 34104 showed that mosaic reduced the tonnage yield by about 30% in the plant cane and first ratoon crops and the production of 96° sugar per acre by 27% in plant cane and 42% in the first ratoon.

4691. KNUST, H. G.

Notes on the heat treatment of cane plants

at the Bundaberg Sugar Experiment Station.

Cane Grs' Quart. Bull., 1953, 17: 33-6.

A cure for ratoon stunting disease can be achieved by treating plants in water at temperatures ranging from 50° C. for 1½ hours to 54° C. for ¾ hour. Trials at Bundaberg, here recorded, show considerable difference in varietal reaction, in as much as some varieties germinate poorly after being submitted to the higher

temperatures. Generally-speaking treatment at 52° C. for 1½ hours was followed by better germination than treatment at 53° C. for 1 hour. Hot air treatment at the same temperature, but with an exposure of 13 hours, showed much promise. After hot air treatment cane should be soaked in a mercurial solution to restore lost moisture and control rots. Adequate soil moisture is also necessary.

4692. ABBOTT, E. V.

Evidence for the occurrence of a hitherto unrecognized growth-retarding disease of sugarcane in Louisiana.

From abstr. in *Phytopathology*, 1953, 43: 289.

Marked growth retardation and stunting of some varieties of sugar cane has frequently been observed in Louisiana in recent years during prolonged dry weather. In 1951/52 inoculation of vigorous, apparently healthy, stem cuttings with juice from 2 affected varieties resulted in the appearance of the symptoms. In general, the symptoms resemble those of a virus disease recently described in Australia.

4693. BOUCHEREAU, P. E.

Virulence of a root pathogen as conditioned by nutrition.

From abstr. in *Phytopathology*, 1953, 43: 289.

Pythium isolates from sugar cane varieties growing on virgin soil generally were found to be only mildly parasitic on corn roots but some of them, when treated with aldehyde, produced greater injury. That the effect of the aldehyde was on the organism rather than the host was indicated by tests with sugar cane varieties of varying degrees of resistance to root rot. Juice analyses suggested that the degree of damage produced by even virulent strains may be limited by the nutritional compounds contained in the roots themselves.

4694. ANON.

Mycology.

A.R. Madras Sugarcane Res. Scheme 1949-50, [1951?], pp. 47-57.

Smut (Ustilago scitaminea). Seed treatment experiments. In an experiment to find out the protective and stimulating effect of immersing setts in bordeaux mixture (1%) and in running water for different periods (6, 12 and 24 hours) on germination and growth under irrigated and unirrigated conditions there were significant differences between treatments but none was better than the control. Similarly when setts were treated with 1 and 2 lb. agrosan in 10 gal. water, 1 and 2 lb. ceresan in 10 gal. water, bordeaux paste, 6 hours' soaking in 1% bordeaux, there were significant differences between treatments in both germination and yield but none was better than the control.

4695. BOX, H. E.

List of sugar-cane insects.

Commonw. Inst. Ent., 41 Queens Gate, London, S.W.7, 1953, pp. 101, bibl. 88, 15s. or \$2.25.

The subtitle runs "a synonymic catalogue of the sugar cane insects and mites of the world, and of their insect parasites and predators, arranged systematically". Part I concerns pests, Part II parasites set out in their natural orders indexed alphabetically by their scientific

names, together with alternatives at the end of the bulletin. An index of countries where the different insects are found is given. In the bibliography only papers of a general nature are named and systematic works relating to specific groups of insects are not included. A valuable work of reference to the worker in sugar cane.

4696. NARAYANAN, E. S.

The root, stem and top borers of sugarcane and the methods of their control.

Indian Fmg, 1953, 3 (1): 8-11, 21, 29-30, illus.

Short descriptions, with notes on distribution in India, biology and damage, are given of the root borer, *Emmalocera depressella*; the 6 stem borers, *Argyria sticticrasis*, *A. tumidicostalis*, *Diatraea auricilia*, *D. venosata*, *Chilo trypetes* and *Sesamia inferens*; and the top borer, *Scirpophaga nivella*. Recommended control measures are: root borer—avoid ratooning as far as possible, dig out and destroy stubble after harvesting; stem borers—use uninfested setts, avoid ratooning as far as possible, set light traps, earth twice lightly during the early stages of the crop; top borer—destroy egg masses, set light traps. In addition, the egg parasite, *Trichogramma evanescens minutum*, can be employed against root and stem borers, and first stage larvae of root, stem and top borers can be controlled before entering the plant by spraying with 0.25% DDT or 0.4-0.5% BHC.

4697. POTTER, T. E. K.

Sugar-cane frog hopper control in Trinidad, season 1952.

Plant Prot. Overs. Rev., 1953, 3 (4): 19-20, illus.

Satisfactory results were obtained in 1952, a year of unusually severe attacks, with a 4.5% BHC "agrocide" dust formulation applied at 1½ cwt. per acre round the bases of the stools for nymph control, and with "drift dusting" by power dusters working at the sides of fields against adults which had begun to attack fields too dense to permit entry.

4698. MISHRA, J. N.

Green muscardine fungus on sugarcane frog-hoppers in Bihar.

Sci. and Cult., 1953, 18: 547-8, bibl. 1.

In November-December 1952 many *Pyrilla* adults and nymphs were killed by *Metarrhizium anisopliae* in North Bihar. The possibility of multiplying the fungus on a large scale for biological control of the frog-hopper is being investigated.—Agric. Res. Inst., Sabour, Bhagalpur.

4699. DICK, J.

The mealybug and sugar cane. Interim report on Natal investigations.

S. Afr. Sugar J., 1953, 37: 317-23, bibl. 8.

Notes are given on the results to date of experiments to ascertain to what extent the mealybug *Trionymus sacchari* affects the development of cane. Its depressing effect on early growth has been proved and the persistence of at least part of this after the removal of the insects suggests that the direct effect of feeding is not the only factor. Inoculation experiments suggest that the insect may at certain times be capable of causing disease by injecting toxic substances.

4700. BIRCHFIELD, W.

Parasitic nematodes associated with diseased roots of sugarcane.

From abstr. in *Phytopathology*, 1953, 43: 289.

Experiments demonstrated the association of large numbers of nematodes of unidentified species of *Tylenchorhynchus* and *Pratylenchus* with abnormal sugar cane roots in Louisiana. Symptoms of the disease were dwarfing of the entire plant, apparently due to an impaired root system. The diseased roots lacked feeder roots and the small roots were blunt and coarse and showed characteristic browning and lesions.

4701. McDOUGALL, W. A.

A note on pot experiments with "gammexane" (benzene hexachloride) in soil.

Qd J. agric. Sci., 1952, 9: 41-5, bibl. 14, illus.

In pot experiments with single eye sugar cane setts planted periodically in thoroughly mixed gammexane commercial dust containing 10% BHC (1.3% gamma isomer) and soil in proportions from 1: 250 to 1: 50,000 the insecticide damaged the roots when applied at from 1: 250 to 1: 10,000. It was not possible to evaluate the half-life of gammexane in the soil through its effects on root growth owing to a distinct change in the system about 16 months (in this case during the second summer) after the gammexane and soil were mixed. [From author's summary.]

4702. WILLIAMS, J. R.

Field rats on sugar estates and methods for their control.

Rev. agric. Maurice, 1953, 32: 56-66, bibl. 8.

Information drawn from overseas on field rat control in sugar cane, a practice not yet common in Mauritius. Methods discussed are trapping, cover destruction and poisoning by (1) red squill (*Urginea maritima*), (2) Zn phosphide or thallium phosphate, and (3) warfarin.

4703. GUILBEAU, W. F., AND MARTIN, L. F.

A pilot plant for processing small samples of sugar cane.

Sugar J., 1953, 16 (1): 12, 14-15, bibl. 4, illus.

Further details are given of the operation of the pilot plant described in earlier papers [see *H.A.*, 22: 3143 and 23: 1325]. It was designed primarily to compare the processing behaviour of juices of new cane varieties, but will also prove useful in studies on factory technology. The total space required by the plant is an area of 20×30 ft. with a head space of 12 ft. A detailed description with drawings will be sent on request to anyone wishing to instal similar equipment.—S. reg. Res. Lab., New Orleans.

Tea.

(See also 4727 l, q, u.)

4704. LEONARD, W. H., AND ROBERTS, R.

Tea in Japan.

Nat. Res. Sect. Rep. G.H.Q. Supr. Cmdr All. Powers 125, 1949, pp. 54, bibl. 13, illus. [received 1953].

This report gives an account of tea growing, manufacture, marketing and research in Japan. The production of green tea (*Thea bohea*) is much greater than of black;

the characteristics are given of 13 of the principal Japanese tea varieties and the commercial characteristics of their products (2 of them black tea). Propagation is generally by the direct sowing of seed. The final spacing after 3-4 years' thinning is 30 cm. apart in rows 1.5-3.0 m. apart. A year after thinning the plants are headed to 20-30 cm. and during the next 5-6 years pruning is designed to form a dense semi-circular bush 0.8-1.0 m. high at the top and equally wide at the base. Organic and inorganic fertilizers are employed liberally, P and especially N being very important. In harvesting, the terminal bud and upper 3-4 leaves are taken and there are ordinarily 3 (and sometimes 4) pickings a year in May to September. Some special grades are shaded for a few weeks before harvesting. Methods of control of the principal insect pests are described; the 4 most harmful ones are *Adoxophyes privata*, *Chlorita flavescens*, *Phrixolepia sericea* and *Homona coffearia*; pyrethrum, nicotine and rotenone are the insecticides chiefly used. The 4 most prevalent diseases are brown blight (*Guignardia camelliae*), anthracnose (*Gloeosporium theae-sinensis*), blister blight (*Exobasidium vexans* and *E. reticulatum*), and leaf spot (*Phyllosticta theaeifolia*); control of these and other diseases is ordinarily by bordeaux mixture. [See also *H.A.*, 22: 4483.]

4705. TEA RESEARCH INSTITUTE OF EAST AFRICA.

Annual Report of the Tea Research Institute of East Africa, 1952, 1953, pp. 35.

The laboratories were officially opened on 27 March, 1952. The report includes: *Agricultural Department. Manuring*. In the factorial experiment started in 1951 to determine the effect of N, P, K, S and Napier grass mulch a reliable response was shown only at one centre and only by N which gave increased yields in both years, the 1951 increase being just over 4 lb. tea per lb. N applied. *Propagation*. (1) Plants raised from cuttings were not inferior at 2½ years old to those raised from stumped seedlings and averaged 4 ft. 5 in. (2) Neither the use of a stone drainage layer nor planting against porous tiles to improve drainage and aeration gave significant improvement in the rooting of cuttings, and the use of alginates as soil conditioners reduced strike. (3) In a more recent trial with cuttings the principal results 6 months after planting were that red soil (subsoil) was a significantly better rooting medium than black soil (top soil), the inclusion of 50% sand in the medium had no significant effect, nicking the stem (a practice that improves the rooting of ornamental *Camellias* at Wisley) had a non-significant negative effect, dipping with perenox against brown and grey blight had no significant effect, and clones 3 and 4 showed distinctly better development and rooting than clones 1 and 2. (4) In an experiment on the effect of growth substances on rooting, several phenoxy-acids, one naphthoxy-acid and 2 seradix compounds were employed; after the usual 24-hour soak only the seradix treatment gave a good percentage of survivors; a quick-dip experiment has been started. *Chemical Department*. In the experiment on hut sites on which tea fails to flourish because of the soil alkalinity, the addition of S gave the top soil an acid reaction and had some effect on the subsoil, but the treatment was not economical. Seasonal variations in polyphenol content and enzyme activity continue to be studied.

4706. EDEN, T.

Tea nursery technique.

Pamph. Tea Res. Inst. E. Afr. 4, 1953, pp. 8.

Topics discussed are site (avoid poorly drained and old dwelling sites), preparation of beds (thorough cultivation to 2 feet and fine tilth to 4-6 in.), shading (artificial top and side shading preferable to live leguminous shading which encourages *Heterodera marioni*), seed spacing (6 in. × 6 in. or 5 in. × 5 in.), germination (pre-germination in sand preferable to nursery bed sowing; separation of sinkers and floaters), planting, manuring, maintenance (avoidance of over-watering), and hardening-off.

4707. VAN DER KNAAP, W. P.

Enige gegevens over de variabiliteit in productievermogen van theeclonen. (Some data on the variability in production capacity of tea clones.) [English summary and conclusions 1½ p.]

Arch. Theecult., 1953, 18: 115-46, * bibl. 7.

Yield variation at a given pluck was smaller in clonal than in seedling tea where soil differences were small, but in heterogeneous soils yield variation was greater in the clones. Over a given period the yield variation due to climatic changes was greater in clones than in seedlings. Some clones yielded better soon after pruning than later, others gave progressively increasing yields after pruning. Frequency of pruning should be regulated to suit the type of clone. Yields of budded tea are small compared with those of seedlings, as a result of the smaller framework of the clones. A fairly high correlation (+0.69) was found between number of branches after pruning and subsequent yield. The number of branches on seedlings was much higher than that on clones, although the difference became smaller as the age of the bushes increased. Precision of field experiments can be largely increased by the use of a covariance analysis on number of branches after pruning, provided enough replications are used. It is concluded that for measuring yield capacities it is desirable to determine the yields over a long period, preferably for a whole period between prunings.

4708. VAN HEUSDEN, W. C.

Aanbevelen theeplantmateriaal. (Recommended tea planting material)

Bergcultures, 1953, 22: 181.

At the Pasir Saronggé Trial Garden, Indonesia, the following 3 clones have proved to be outstanding in combining resistance to blister blight with cropping capacity and rooting ability: PS 1, KP 4, and GP 7. Eight other promising clones showing some resistance to blister blight are mentioned.

4709. VENKATARAMANI, K. S.

Some aspects of the work of the botanical section of the Tea Experiment Station.

Bull. U.P.A.S.I. Tea sci. Sect. 11, 1953, pp. 4-11, bibl. 8.

Red rust (*Cephaeleuros parasiticus*), a leaf and stem disease of weak bushes, which extended its range in Southern India in 1951, has not yet caused any great damage but is potentially serious. Control is by maintaining bushes in good vigour and by spraying with a

* Revised pagination; pagination as printed (2): 1-31.

Cu fungicide, which should be carried out, it is suggested, immediately after pruning and in early May for mature tea, and in March/April and early May for new clearings and young tea. *Soil moisture status*. Investigations at Devarshola Tea Experiment Station in a field of tea at 4×4 ft., half of which is shaded by dadap trees at 20×20 ft., revealed both a considerable difference between the moisture contents in the 2 areas as early as November, i.e. at the end of the monsoon, when the soil can be expected to be wet, and a higher moisture content in the shaded area even after prolonged drought despite the actively growing shade trees.

4710. DE JONG, P.

Some notes on the manuring of tea under present day conditions.

Bull. U.P.A.S.I. Tea sci. Sect. 11, 1953, pp. 20-2.

An experiment to assess the effects of applying N (at 0, 40 and 80 lb./acre) and P and K (each at 0, 20 and 40 lb.) alone and in combination was set out at the U.P.A.S.I. Tea Experiment Station in the Nilgiri Wynaad in 1940. The results after four 3-year pruning cycles are discussed. 40 lb. N has slightly but not significantly increased the yield, whereas 80 lb. N has very significantly increased it. 20 lb. P and 40 lb. P have each slightly but not significantly increased yield. 20 lb. K and 40 lb. K did not have much effect for the first two cycles but gave significant yield increases over nil K by the end of the third cycle and even greater increases by the end of the fourth. To get the best value from N, K should be applied.

4711. VINK, A. P. A.

Proeven en problemen met betrekking tot bemesting en schaduw in de theecultuur. (Experiments and problems in connexion with manuring and shading of tea.) [English summary 24 p.]

Arch. Theecult., 1953, 18: 147-205*, bibl. 42.

The following recent results from long-term experiments carried out at the Pasir Sarongge Experimental Garden are discussed: (1) NP fertilizers had a significant positive effect on tea yields, but K fertilizers resulted in a decline in production, which was not significant. (2) There was a very significant increase in production from applications of sulphate of ammonia, which was approximately linear up to rates of 640 kg. per ha. per year. There was probably an increase in production from dressings of double superphosphate up to 240 kg. per ha. per year, but in this experiment the increase was not significant. (3) Sulphur dressings of up to 6,000 kg. per ha. resulted in a significant increase in production even after a period of 20 years. (4) Removal of shade trees resulted in an increase in production for a few years after which yields began to decline. Finally recent literature from India and Ceylon is reviewed and some aspects of soil productivity, cultivation and manuring are discussed.

4712. PAUL, W. R. C.

Promising legumes.

Trop. Agriculturist, 1952, 108: 271.

In current trials of ground cover crops for tea in Ceylon 2 non-creeping species have shown promise: the

* Revised pagination; pagination as printed (2): 33-91.

indigenous *Crotalaria evolvuloides* and the exotic *Stylosanthes bojeri*.

4713. TIDEMAN, P.

Resultaten van een proefneming met mechanische snoei van thee. (Results of an experiment in the mechanical pruning of tea.) [English and Indonesian summaries 20 and 28 lines resp.]

Bergcultures, 1953, 22: 135-44, bibl. 1, illus.

Trials carried out with the Tarpen Hedgemaster tea pruner showed that mechanical pruning did not result in any saving of labour compared with hand pruning and the cost was higher. The quality of mechanical pruning was satisfactory, although it was found necessary to sharpen the knives repeatedly in order to obtain clean cuts. No difference could be observed in the recovery of the bushes pruned by machine and by hand. In order to obtain economic results it is considered that the working capacity of the machine would have to be increased fourfold. Lengthening the cable is also considered desirable.

4714. MALAYA.

Tea. (ii) Blister blight disease.

A.R. Malaya Dep. Agric. 1950 and 1951, 1953, p. 35.

Blister blight (*Exobasidium vexans*) appeared for the first time in Malaya in February 1950. It is now established in all tea areas at Cameron Highlands and occasionally occurs on lowland tea during cold, wet periods. A trial showed that Cu sprays give good control at 0.125% Cu content and 12-18 gal. per acre. In another trial perenox was used at normal (0.25%) and half strength alone and with the addition of lissapol (0.05%) or albolineum (0.5%). These spreaders did not give significantly increased control with normal-strength perenox, but the addition of lissapol to half-strength perenox did give improved control, the results being as good as with normal-strength perenox.

4715. LOOS, C. A.

Meloidogyne brevicauda, n.sp., a cause of root-knot of mature tea in Ceylon.

Proc. helminth. Soc. Wash., 1953, 20: 83-91, bibl. 8, illus.

A description is given of *Meloidogyne brevicauda* n.sp., which Thorne correctly suggested was distinct from *Heterodera marioni* (*Meloidogyne* sp.). Whereas the latter, though causing severe galling of the roots of tea seedlings under 6 months old and of the green manure crops *Tephrosia vogelii* and *Erythrina lithosperma*, appears to have little ill-effect on mature tea bushes, the new species may seriously restrict new growth in mature bushes especially in the period following pruning.—Tea Res. Inst. Ceylon.

4716. ANANDA RAU, S.

The problem of red spider in South India.

Bull. U.P.A.S.I. Tea sci. Sect. 11, 1953, pp. 13-17.

Metatetranychus bioculatus is discussed under the following headings: appearance, life history, field symptoms, history, damage, seasonal prevalence, status and control. Its increasing importance is ascribed to: (1) removal or drastic reduction of shade; (2) increased use of insecticides and fungicides; (3) a recent succession

of severe droughts; and (4) the weakened condition of tea due to inadequate attention during the war and to blister blight.

4717. DE JONG, P.

Investigations into the use of certain materials for the lining of tea chests.

Plant. Chron., 1953, 48: 241-2, bibl. 1.

Judged by the scoring of tea tasters alkathe and pliofilm proved greatly inferior to the ordinary lining materials used for tea chests, foil and tissue paper.

Sundry crops.

(See also 4727w, x.)

4718. ISLAM, A. S.

A preliminary report on the colchicine-induced tetraploids of *Anona squamosa* L.

Curr. Sci., 1953, 22: 118-20, bibl. 5, illus.

Tetraploidy ($4n=28$) was induced in *Annona squamosa* by seed treatment with colchicine, in the hope of increasing the pulp and reducing the number of seeds in the fruit. Treated plants showed the leaf symptoms characteristic of tetraploidy and some of them, it was interesting to note, flowered at the early age of 20 months, producing some fruits.

4719. MARUDARAJAN, D.

"Koleroga" or "mahali" disease of areca-nuts.

Plant Prot. Bull., New Delhi, 1951, 3: 117-18, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 211.

In certain years the areca nut koleroga disease [*Phytophthora arecae*] causes heavy losses of areca crops which cover a total area of 100,000 acres in the Malabar and South Kanara districts of India. Detailed experiments at Mundaji, in South Kanara, have shown that 1% bordeaux mixture spray, applied just before the monsoon and once again about six weeks later gave adequate control without added adhesive.

4720. MATUDA, E.

Las Bromeliaceas de Chiapas. (The Bromeliaceae of Chiapas.)

An. Inst. Biol. Mex., 1952, 23: 85-153.

Botanical descriptions of the Bromeliaceae of the Chiapas region of Mexico with an identification key. Economic species in addition to pineapple are the fibre plant *Aechmea magdalenae*, and *Bromelia pinguin* and *B. karatas*, from which refreshing drinks are prepared.

4721. HAARER, A. E.

Usefulness of the cashew tree and nuts.

New Commonw., 1953, 25: 500-1, illus.

The cashew tree flourishes on sandy soils of medium fertility in parts of the tropics, where there are distinct wet and dry seasons and a rainfall of 30-50 in. In Africa the tree is being grown in Tanganyika and Portuguese East Africa, partly for export to India, and a big production is planned in Nigeria. Methods of cultivation harvesting and processing are briefly discussed.

4722. MARTÍNEZ, M.

Las Casimiroas de México y Centroamérica. (*Casimiroa* species of Mexico and Central America.)

An. Inst. Biol., 1951, 22: 25-81, illus. [received 1953].

Botanical descriptions and a key to their identification are given for the seven species of *Casimiroa* (and their varieties and forms) of Mexico and Central America. [See also *H.A.*, 23: 3627o.]

4723. GONZALEZ, L. G., AND FABELLA, E. L.

Inter-generic graft affinity of the chico [sapodilla].

Philipp. Agric., 1952, 35: 402-7, bibl. 3.

The slow growth of sapodilla (*Achras sapota*) seedlings for rootstocks is the limiting factor in the multiplication of this species by grafting. The results are briefly reported of a search among near relatives for more rapid-growing seedlings and of a study of their graft affinity with sapodilla. Of 4 species tested sapodilla was the slowest-growing, the average height of the seedlings after 15 months being only 12.05 cm. compared with 60.06 in *Chrysophyllum cainito*, 55.68 in *Lucuma nervosa* and 13.02 in *C. oliviforme*. Of 9 near relatives tested as stocks for sapodilla *Palaquium foxworthyi*, *P. merrillii*, *P. philippense* and *Madhuca betis* showed high degrees of compatibility.

Cover crops.

(See also 4219, 4221, 4222, 4712, 4727v.)

4724. CHAUDHARI, B. B., AND PATIL, J. A.

A "creeping" mutant in *Cajanus cajan* Mills.

Curr. Sci., 1953, 22: 153.

Detailed studies are to be published of two creeping mutants whose prostrate habit would be useful in a cover crop.

4725. SAMUELS, G., AND LANDRAU, P., JR.

Influence of nitrogen, calcium, and boron on the nodulation, yield, and protein content of tropical kudzu.

J. Agric. Univ. Puerto Rico, 1953, 37: 74-80, bibl. 5.

In greenhouse experiments to determine the effects of Ca, B, and N on nodulation and yield of tropical kudzu, *Pueraria phaseoloides*, Ca was applied as CaCO_3 at 10,000 lb. per acre, N as $(\text{NH}_4)_2\text{SO}_4$ at 250 lb. N per acre, and B as borax at 30 lb. per acre. The results were: (1) applications of N reduced nodulation per plant drastically, but increased yields significantly in the first cutting; (2) lime increased nodulation and yields when applied to a soil with a pH value of 4.4, but had less effect on a soil with a pH value of 5.1; (3) when used with lime, N reduced nodulation as much as it did when used alone; (4) B or B with lime had no consistent influence on yields or nodulation; (5) the protein content of the kudzu was not measurably influenced by any of the treatments as compared with the control. [From authors' summary.]

4726. LANDRAU, P., JR., SAMUELS, G., AND RODRÍGUEZ, P.

Influence of fertilizers, minor elements, and soil pH on the growth and protein content of tropical kudzu.

J. Agric. Univ. Puerto Rico, 1953, 37: 81-95, bibl. 5.

The effect of fertilizers and lime on yield in *Pueraria phaseoloides* was studied in greenhouse and field experiments. A summary of the results is: (1) green matter yield increased with pH on limed soils, reaching

the maximum at pH 7.5; (2) on a friable acid clay neither N, P nor K caused a response, but on another clay N and P but not K produced significant yield increases; (3) both lime and N increased yields for the first cutting only; (4) N and Ca were valuable in establishing good stands on very acid soils (below pH 5) of low fertility; (5) B and Mg had negligible effects on yield.

Noted.

- 4727.
- a ABBOTT, E. V., AND SCHEXNAYDER, C. A.
A sclerospora infection of sugarcane in Louisiana.
From abstr. in *Phytopathology*, 1953, **43**: 289.
 - b ASHPLANT, H.
How close should hevea rubber be planted?
India Rubb. J., 1953, **124**: 471-2, 478, from abstr. in *Trop. Abstr.*, 1953, **8**, No. 1583.
 - c BELL, R. G.
Coffee growing areas in Central and South America and the West Indies.
Mon. Bull. Coffee Bd Kenya, 1953, **18**: 444-8.
Practices in Guatemala, El Salvador, Costa Rica, Cuba and Jamaica.
 - d BRABER, P.
Structure and composition of natural rubber.
Indon. J. nat. Sci., 1952, **108**: 117-30, bibl. 32, illus., being *Commun. Rubber-Stichting, Delft*, 199.
 - e CEYLON COCONUT RESEARCH SCHEME.
Instructions for soil conservation practice in smallholdings and highland allotments.
Leaflet. Coconut Res. Scheme Ceylon 16, [1953?], pp. 5.
On planted and unplanted land.
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Vençamos a rotina do café. (Let us improve coffee technique.)
Bol. Super. Serv. Café, S. Paulo, 1953, **28**: 7-10.
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Contour lining, holing and filling, cutting of platforms, trenches and drains.
Adv. Circ. Rubb. Res. Stat. Ceylon 36, 1953, pp. 6.
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 - h D[AS], G. M.
Plant louse attacking *Albizia odoratissima* plants in nurseries.
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Indian Coconut J., 1952, **6**: 30-4, bibl. 6, illus.
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Calif. Agric., 1953, **7** (6): 11-12, illus.
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Development of coconut cultivation in West Bengal.
Indian Coconut J., 1952, **6**: 35-40, illus.
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Physico-chemical indices of the suitability of soils for tea cultivation. [Russian.]
Pochvovedenie, 1953, No. 2, pp. 70-82, from abstr. in *Soils and Ferts*, 1953, **16**, No. 1586.
 - m GUPTA, Y. C.
Sugarcane and oats silage.
Indian Fmg, 1953, **3** (3): 18-19, 30, illus.
 - n HEINISCH, K. F.
De bevolkingsrubber in Zuid-Sumatra. (Native rubber in South Sumatra.) [English and Indonesian summaries 26 and 30 lines resp.]
Bergcultures, 1953, **22**: 153-61, illus.
Problems of improving quality.
 - o HOWARD, R. A.
Botanical gardens in West Indies history.
Gdn J. N.Y. bot. Gdn, 1953, **3**: 117-20, illus.
Historical notes on their establishment and on some plant introductions.
 - p HUTCHISON, F. W.
Experiments on the control of root disease in a [rubber] replanting.
Arch. Rubbercult., Extra No., May 1953, pp. 117-26.
Tree and stump poisoning and clearance.
 - q VAN DER KNAAP, W. P.
Blisterblight resistentie van theeclonen. (Blister blight resistance of tea clones.)
Bergcultures, 1953, **22**: 177-9, bibl. 2, illus.
Methods of selection [see also *H.A.*, 23: 3619].
 - r LASSCHUTT, J. A., AND VOLLEMA, J. S.
The mildew resistant clone LCB 870.
Arch. Rubbercult., May 1953, *Extra No.*, pp. 132-5.
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 - s LEROY, J.-F.
La structure du bois d'*Annamocarya*. Notes sur les bois des noyers et autres Juglandacées. (The wood structure of *Annamocarya*. Notes on the wood of the walnut and other Juglandaceous genera.)
Notes géographiques sur les noyers tropicaux (*Juglans* et *Carya*). (Geographical notes on the tropical walnuts, *Juglans* and *Carya*.)
Rev. int. Bot. appl., 1953, **33**: 216-20, illus., and 221-5, illus.
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J. Agric. Univ. Puerto Rico, 1953, **37**: 35-43, bibl. 26.
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- v MES, M. G.
Studies on the growth and reproduction of the kudzu vine (*Pueraria thunbergiana* (Sieb. and Zucc.) Benth.). S. Afr. J. Sci., 1953, 49: 335-9, bibl. 7.
- w VAN DER PIJL, L.
On the flower biology of some plants from Java with general remarks on fly traps (species of *Annona*, *Artocarpus*, *Typhonium*, *Gnetum*, *Arisaema* and *Abroma*) Ann. bogor., 1953, 1: 77-99, bibl. 27, illus. Including *Annona muricata* and *Artocarpus heterophylla*.
- x RAO, U. N., AND RAO, V. N. M.
Cashewnut—a dollar earning crop of India. Indian Fmg, 3 (4): 16-17, 32, illus.
- y R[AYNER], R. W.
The timing of anti-leaf-fall ("tonic") sprays. Mon. Bull. Coffee Bd Kenya, 1953, 18: 394.
For coffee in Kenya [see also abstract 4608].
- z REVILLA, V. A.
Algunos resultados de las investigaciones sobre la nueva enfermedad de la cana de azucar en el País. (Some results of investigations on a new sugar cane disease in Peru.) Inf. Minist. Agric. Peru, 1952, 76: 1-8, from abstr. in Trop. Abstr., 1953, 8, No. 1696.
Due, it is believed, to *Sclerospora macrospora* [see also H.A., 23: 2344].
4728.
a RUBBER RESEARCH INSTITUTE OF MALAYA (DAVIDSON, L. R.).
Annual Reports of the Smallholders Advisory Service of the Rubber Research Institute of Malaya for 1949-51, 1953, pp. 24 (1949), 16 (1950) and 26 (1951).
- b SHERMAN, M.
Effects of carbon dioxide on fruit flies in Hawaii. J. econ. Ent., 1953, 46: 15-19, bibl. 8, being Tech. Pap. Hawaii agric. Exp. Stat. 265.
Dacus curcurbitae, *D. dorsalis* and *Ceratitis capitata*.
- c SIERRA, R. A. M.
El "carbon" de la caña de azúcar en la provincia de Corrientes. (Carbon disease of sugar cane in the province of Corrientes [Uruguay].) Arch. Fitotéc. Uruguay, 1952, 5 (1): 3-5, bibl., illus., from abstr. in Trop. Abstr., 1953, 8, No. 1575.
Ustilago sacchari and *U. scitaminea*.
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Ontwikkeling en toekomst van de ondernemingslandbouw in Australisch New Guinea. (The development and prospects of plantation crops in the Territory of Papua-New Guinea.) [English summary 6 lines.] Landbouwk. Tijdschr., 1953, 65: 248-68, illus.
- e SIMMONDS, N. W.
Segregations in some diploid bananas. J. Genet., 1953, 51: 458-69, bibl. 9.
- f SINGH, S. R.
Notes on the life-history of the coconut leaf moth, *Agonoxyena argaula* Meyr. Agric. J. Dep. Agric. Fiji, 1952, 23: 106-7.
- g TIRUMALA RAO, V.
The mango and its hopper [*Idiocerus* spp.] problem in the Madras State. S. Indian Hort., 1953, 1: 25-8.
- h VERVOLET, C.
De toename van het gehalte aan vrije vetzuren in ruwe palmolie gedurende opslag en transport. (The increase in free fatty acid content of crude palm oil during storage and transport.) [English and Indonesian summaries $\frac{1}{2}$ p. each.] Bergcultures, 1953, 22: 218-21, bibl. 2.
- i WARNER, J. N.
The evolution of a philosophy on sugar cane breeding in Hawaii. Hawaii. Plant. Rec., 1953, 54: 139-62.
Extensive as opposed to intensive breeding.

NOTES ON BOOKS AND REPORTS.

Books.

4729. BLASDALE, W. C.
Cyclamen persicum. Its natural and cultivated forms.
Stanford University Press, California, and Geoffrey Cumberlege, London, 1953, 9×6 in., pp. 49, bibl. 22, illus., 12s.
Cyclamen persicum is the source of the large flowered Persian cyclamen so widely grown by florists. In this well-produced little book information has been gathered together from old herbals, nurserymen's catalogues,

botanical monographs and horticultural journals on the history and botany of the species. Several interesting facts emerge, among them that *C. persicum* has never been found growing naturally within the borders of Persia, and that the specific name *antiochenum* antedates *persicum* by either 3 or 10 years and therefore has priority over the latter. It also appears that *C. persicum* possesses a latent capacity for producing two more leaves and flowers (usually sterile) on the same stalk. Although this may not prove an advantage aesthetically, it constitutes yet another challenge to find some way of propagating the plant vegetatively.

After dealing with the genetics and various cultivated forms of the cyclamen, the author gives very brief notes on its cultivation as a greenhouse plant and on its possibilities as a bedding plant in such districts as southern France and southern and central California. In these days of scientific specialization it is gratifying to note that the author is professor of chemistry at the University of California. P.R.-D.

4730. CHARLEY, V. L. S., MUMFORD, P. M., AND MARTIN, E. J.

The cider factory. Plant and layout.

Leonard Hill, London, 1953, pp. 109, 10×7½ in., Figs 54, 20s., being a translation of Technical Publication No. 2 of the Rural Engineering Service of the French Ministry of Agriculture, entitled "Cidreries", published in France by Librairie agricole, horticole, forestière et ménagère, Librairie de l'Académie d'Agriculture, 26 Rue Jacob, Paris VIe.

English cider makers have been unfortunate in that, until quite recently, there has been no modern textbook, written in English, on their industry. This position was alleviated to some extent by Dr. V. L. S. Charley's translation [see *H.A.*, 20: 2127] of the late Professor G. Warcollier's *La Cidrie*, which had last been published in 1928. The translation, in spite of some new material, did not give a comprehensive description of modern cider-making practice. Dr. Charley has now translated *Cidreries*, an account of French cider-factories, their plant and layout. This book gives detailed advice on the choice of a suitable site, water supply, drainage and effluent disposal. Fruit handling, building and tank construction are dealt with in turn, followed by advice on the provision of machinery, ancillary services, ventilation and laboratory accommodation. Great emphasis is rightly placed on hygiene and economy of man-power in factory operations. Although some of the methods described are not at present used to any extent in English cider-making, refrigeration at least could be adopted with advantage, not so much for the preparation of naturally sweet ciders as for the safe storage of the fully fermented product. This book, admirably illustrated with many clear diagrams, will be invaluable, not only to cider-makers wishing to rebuild or modernize their factories, but also to works managers in other beverage and food industries.

It is a pity that the opportunity was not taken to correct some of the errors and omissions found in the earlier French edition, such as the incorrect microbiological details given in the Introduction, the discrepancies between the description and the diagram of the counter-current pomace drier, and the lack of information on modern fungicidal wall finishes. The plans of cider factories in Figures 51-54 would have been more helpful if they had provided an example of how the capacity of a factory could be increased progressively rather than illustrating four independent and unrelated schemes.

The book has been translated very satisfactorily although there are a few minor instances where it has been difficult to find a suitable English equivalent, e.g. the heading of Chapter VII and on page 82 where the addition of *chalk* to distillery residues is advised to

give a pH of 12 where *lime* would seem to be indicated. The alterations made in rearranging the diagrams of keeving and racking vats, have not assisted clarity. These criticisms, however, are only of detail, whereas the principles and methods advocated in this book are eminently sound and could be followed with profit by all cider makers. F.W.B.

4731. CROCKER, W., AND BARTON, L. V.

Physiology of seeds.

Chronica Botanica Company, Waltham, Mass., and Wm. Dawson & Sons, London, 1953, 9×6 in., pp. xv+267, bibl. approx. 1,100, illus., \$6.50.

The scope of this book is indicated by its extended title, "An introduction to the experimental study of seed and germination problems". The authors explain, however, that their aim has been "to give a broad coverage of our present knowledge on seed and germination in a volume of moderate size", and that this is "an outline rather than a treatise". To economize space, historical treatment of the subject has been avoided, certain topics, such as seed dispersal, have been omitted, and references reduced to the minimum necessary to provide a background for the discussion (even so, they amount to some 1,100). Single chapters are devoted to the anatomy of seeds, seed production (including asexual seed formation), water relations, respiration, storage and life span, vernalization, embryo culture, and seed transmission of disease. Chemical composition, factors affecting germination, and dormancy are each allotted two chapters, and three are devoted to metabolic and energy changes in seed development and germination. Not all these topics are discussed with the same thoroughness; the chapter on anatomy, for instance, is very short, though reference is made to publications where fuller treatment may be found. In the chapter on seed production, mention is made of self-incompatibility in connexion with alfalfa, but no mention is made of the work of Crame and his collaborators at the John Innes Institution. In general, however, a wide field is adequately covered and the book, which is beautifully produced, should prove a useful work of reference to workers in this field. Each chapter is followed by its own list of references and there is a final comprehensive author index covering the names cited in the references. M.C.V.

4732. DEVELOPMENT COMMISSION.

A survey of agricultural, forestry and fishery products in the United Kingdom and their utilization.

H.M. Stationery Office, London, 1953, 9½×6 in., pp. 141, maps, 7s. 6d.

This is the report on an enquiry made by the Development Commission under the following terms of reference: (1) To survey existing products and wastes of the agricultural, forestry, fishery and allied industries in the United Kingdom, and, where practicable, to formulate the main scientific and economic problems in the better utilization of such products; and (2) to record the present facilities for this type of research and development. The information obtained is recorded under the headings: (1) Agricultural crops of the United Kingdom (including field crops, hops, vegetables, fruit, bracken and peat). (2) Imported agricultural crops

(vegetable oil-bearing materials, coffee and tea, cacao, cotton, jute and hemp, and tobacco). (3) Animal products. (4) Marine products (including seaweed). (5) Industrial products and by-products of biological origin (including antibiotics). (6) Timber and forest products.

4733. ENGARD, C. J.

Organogenesis in Rubus.

Res. Publ. Univ. Hawaii 21, 1944, pp. 234, bibl. 141, illustrations 448 [received 1953].

The four species, the comparative ontogeny of which is recorded in this paper, are Subgenus *Cylactis*:—*Rubus pubescens* Raf.; Subgenus *Idaeobatus*:—*Rubus idaeus* (L.) *strigosus* (Michx.) Maxim. Pom. var. *Cuthbert* or red raspberry, *Rubus hawaiiensis* A. Gray or akala and *Rubus rosaefolius* Smith or thimbleberry. This work should be immensely valuable to the student of these species. We regret it has only recently come to our notice.

4734. HAWAII, INDUSTRIAL RESEARCH ADVISORY COMMITTEE.

Abstracts Agricultural, Industrial and Economic Research, Territory of Hawaii 1930-1952, 1953, 11 × 8½ in., pp. 893, price not exceeding \$25 [enquiries to 1015 Bishop Street, Honolulu, Th.].

This extremely valuable tome gives abstracts of articles on the important research work initiated in Hawaii over the last 20 years. In each abstract the purpose of the project is stated, the methods adopted are noted and the results of the work are briefly given. The source of the original articles is quoted.

Flowers, pp. 304-339. The section is divided into sub-sections which deal first with economic problems, and then with the cultivation of the following flower crops: anthurium, hibiscus, orchids—this being much the most important item—carnations, chrysanthemums, gardenias, gladioli, honeysuckle, plumerias, poinsettias and roses.

Fruits, pp. 352-402. Among the fruits [for pineapple see below] which are dealt with at greater length are: avocado, banana, citrus and papaya. Others not quite so important are: date, guava, litchi, mango, melon, passion fruit, peach and plum, while there are a few abstracts devoted to each of the following: breadfruit, cherimoya, fig, grape, guava, loquat, mangosteen, persimmon, poha berry and strawberry.

Miscellaneous agriculture, pp. 452-491. Here are given abstracts of work on many of the tropical plantation crops. Among them are: coffee, spice plants, various fibres, medicinal plants, nuts (viz. cashew, coconut, filbert, pecan and particularly the Macadamia), rubber, tea, tobacco and vanilla.

Pineapple, pp. 492-568, and *Sugar*, pp. 569-789. Very large sections are devoted to these highly important commodities which are the mainstay of the island, and light is thrown on every aspect of the multitudinous problems connected therewith.

Vegetables, pp. 790-880. Nearly all the vegetables on which work has been done and on which abstracts are given here are the common vegetables of temperate climates.

The publication should be immensely useful to anyone working on any of the crops grown in Hawaii as

affording a bird's eye view of what the problems have been in Hawaii and how they have been approached.

D.A.

4735. MIEHE, H., (AND MEVIUS, W.).

Taschenbuch der Botanik. Zweiter Teil: Systematik. (Pocket book of botany. Part II. Taxonomy.)

Georg Thieme Verlag, Stuttgart, 11th revised edition, 1953, 9½ × 6½ in., pp. 180, illus., DM. 8.90.

Frequent revision—lately by W. Mevius—has seen to it that no obsolete conceptions of plant taxonomy are presented to students in this small and ancient textbook. In the 10th edition (1950) the Engler and Prantl system was abandoned for the angiosperms, and in 1953 the gymnosperms received completely new treatment. The main feature of the book, which covers the whole plant kingdom, is its 292 very clear and elaborate line drawings. It is to be hoped that these will help to achieve the authors' object of reviving the sadly fading interest in taxonomy and of encouraging its study.

4736. NATIONAL FEDERATION OF YOUNG FARMERS' CLUBS.

Dictionary of agricultural terms. English-French and French-English and Dictionary of agricultural terms. English-German and German-English.

National Federation of Young Farmers' Clubs, 55 Gower Street, London, W.C.1, 1950, 7 × 4½ in., pp. 45, and 1952, 7 × 4½ in., pp. 51 respectively, 3s. 6d. each.

These are not going to be very useful to the research worker or abstractor. They are, from his point of view, inadequate and sometimes misleading, and if he is of Irish ancestry he might even consider them to be full of omissions. But for the purpose of, not only young farmers, but also peripatetic agricultural scientists sporting themselves in a foreign land few things could more usefully be carried in the pocket than these slim, inexpensive booklets.

D.A.

4737. NICHOLAS, D. J. D.

Chemical tissue tests for determining the mineral status of plants in the field.

The Tintometer Ltd., Salisbury, 1953, 8½ × 5½ in., pp. 33, bibl. 20, illus., 8s. 6d.

This short work is essentially an instruction booklet for use in conjunction with the Lovibond comparator and portable field testing kit manufactured by the publisher. Chemical tissue testing of plants was originated in America and developed by the author and his collaborators at the Long Ashton Research Station as a field method to supplement visual diagnosis of nutritional ills in plants. Briefly, the method is to cut up the petioles of selected leaves and extract them with a buffer solution or a mineral acid; portions of the extract are tested by well known chemical procedures, adapted and modified where necessary to the requirements of a field method. By developing colours or turbidities, the approximate concentration of certain ions in the aqueous extract may be estimated. Detailed working instructions are here given for estimating twelve of them.

In an introduction the author states that the value of the method in diagnosis "is based on the large difference

usually obtained for the mineral nutrient in the extract of a normal plant tissue and one that is deficient in that element", and there he leaves the matter without further discussion. It is, of course, necessary to make certain reservations when interpreting results. Standard values cannot be given for healthy, slightly and severely deficient plants which are valid for different soils at different times of the year, and the method can only be applied as a commentary on the effects of manurial treatments where healthy and unhealthy crops are growing close together. In other words, the method of tissue testing is essentially an experimental tool for use by experts. On the actual methods of estimation little need be said, for they are only intended to be semi-quantitative.

Twenty pages of text are devoted to brief, clear descriptions of the methods of test; a foreword describing the field kit, references and two tables occupy another nine pages. The booklet is well printed on glossy paper and bound in stiff covers. A.C.M.

4738. NORMAN, A.

Successful rose growing.

Collingridge, London, 1953, 9×6 in., pp. 183, illus., 15s.

The author in his spare time has contrived to become one of our most successful amateur rose growers and exhibitors. Here he tells us how he grows and propagates some 3,000 roses without assistance and still finds time to attend to the usual garden subjects. The book is written more particularly for those whose gardening time is limited. By means of the right tools and a methodical approach, work that might otherwise become tedious can be expeditiously and pleasantly performed. It is difficult for a humble reviewer to avoid a little smug complacency on finding some of his pet theories endorsed by so eminent a practitioner; for instance, that the importance of pruning is much over-rated, and again that, when planting, organic manure should be applied as a mulch rather than buried two spits deep where its nutrients will have leached away before the roots can reach them. The rose delights in a naturally rich soil but a heavy hand with the fertilizer only leads to trouble. The idea that the rose is a gross feeder has done untold harm. The operations of planting, pruning, and propagating by every means are well explained and as described by the author's facile pen appear extremely simple. To be the raiser of a popular variety is the wish, secret or expressed, of every amateur. The chapter on how this may be accomplished (success is not guaranteed) is one of the most interesting in the book. Parentage plays a great part, luck and perseverance a greater. That the mental processes of the judge are well understood is evident in the chapter on exhibiting, replete with every (fair) device for catching the great man's eye. The camel confronted with the needle faced a simpler problem than that of presenting on the show bench the fleeting charms of a rose in their full perfection.

Notes are given on each of the many types of rose including ramblers, climbers, polyantha, the best of the wild species and so on. A list of the 24 best roses is pardonably headed by Ena Harkness of the author's own raising, claimed with justice to be at present the finest crimson rose for the garden, possessing all the qualities which a popular rose must possess. It is here

shown in colour. There is a chapter on pests and diseases and a set of useful monthly reminders for the year. The book is well illustrated and has a good index. G.St.C.F.

4739. WALLACE, T., AND MARSH, R. W.

Science and Fruit. Long Ashton Research Station 1903-1953.

University of Bristol Press, 1953, 10×6 in., pp. 308, illus., 30s. or \$4.50. [See also separate abstracts.]

This jubilee volume, pleasantly printed and attractively bound, is confidently recommended to the pomologist in particular and to horticulturists in general throughout the world. It shows the small beginnings and steady growth, from 1903 to 1953, of a particularly English institution, the fame of which has reached the far corners of the earth. The Chancellor of Bristol University, one Winston Churchill, stresses in his foreword the necessity for more food. And surely more food means not only more beef and more wheat and more potatoes but also more of what makes eating a pleasure rather than a duty, namely, the essential products of horticulture such as west country cider and dessert apples. Pre-eminent in facilitating the production of such delicacies is Long Ashton.

After the Chancellor's foreword and a lucid explanatory preface by the Chairman of the Governors, the book opens most inspiringly with Lord Rothchild's lecture on Agricultural Research, 1953. Lord Rothchild, for the uninitiated, is chairman of the Agricultural Research Council. He therefore knows his subject, but what is no less important on such an occasion, he displays a mastery of English not always noticeable in the scientist. Not only are his points clear and precise but they make uncommonly good reading and compel understanding and agreement. He faces difficulties and propounds remedies, so that we come in good humour to the main body of the book.

This consists of articles in simple language by experts who give a remarkable picture of important work achieved and in progress at the research station. Grouping of subjects is under Cider and Fruit Juice, Fruit Culture, Plant Nutrition, Plant Pathology, and Domestic Fruit Preservation. Exact choice of subjects must have been extremely difficult. While, as is most fitting in such a book, earlier work is most interestingly discussed, especially with reference to cider making, the past joins the present in "Notes on 50 years of fruit spraying methods", in "Important pests of apples 1920-50", and in "Effects of orchard factors on keeping qualities", none of which subjects has for a moment lost its importance with the passing of the years. And finally the present takes charge with accounts of the new methods of investigating plant nutrition afforded by sand culture methods, by a study of the mineral nutrition of fungi and by chromatography. Usefully listed are Governing Bodies, Agricultural Committees and Scientific Staff, past and present.

D.A.

Annuals and reports.

4740. BRITISH COLUMBIA.

47th Annual Report of the Department of Agriculture, British Columbia, 1952, 1953,
pp. 195.

Horticultural Branch. Vegetable and fruit variety trials, couch grass control in raspberries, control of mineral deficiencies, sawdust mulch in strawberries, pest and disease control, apple thinning with dinitro-o-cresol and naphthaleneacetic acid sprays, peach blossom thinning. **Plant Pathology Branch.** Apple scab control, control of deficiency diseases, pear fire-blight control (1-1-100 bordeaux at 10% full bloom and again at full bloom recommended; $\frac{1}{2}$ - $\frac{1}{2}$ -100 bordeaux at 48-hourly intervals during blossoming promising), blueberry godronia canker control (spring application of 10-10-100 bordeaux).

4741. D.S.I.R., LONDON.

Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1952, being Food Investigation 1952, H.M. Stationery Office, London, 1953, pp. 56, bibl. 113, 2s.

The report includes an account of work in progress at the Fruit, Vegetables, and Plant Products Division, Ditton Laboratory and Covent Garden Laboratory. The following are among the lines of research pursued: The nature of the volatile products produced by apples; the amino and organic acids of apple fruits; storage of English dessert apples; the determination of ethylene in apple and pear stores; apple fruit respiration; plum storage; fruit rotting; storage dips for Conference pears; vegetable washing; and problems of so-called biological engineering. The report is fully annotated with reference to papers published by the staff, abstracts of which—as far as they are of interest to horticultural science—have already appeared in this journal.

4742. FAO

Yearbook of Food and Agricultural Statistics, 1952. Vol. VI, Part 1. Production, [English, French and Spanish], Rome, 1953, pp. 319, \$3.50 or 17s. 6d.

Section III includes data on acreages and production in F.A.O. countries of many vegetable, fruit and plantation crops. The statistics of fertilizer and "pesticide" consumption are given in Section IV. The world market prices listed in Section VII for the period 1934-51 include those for cane sugar, citrus fruit, dried fruit, coffee, cacao, tea, tobacco and rubber.

4743. FAO

Yearbook of Food and Agricultural Statistics, 1952. Vol. VI, Part 2. Trade, [English, French and Spanish], Rome, 1953, pp. 290, \$3.50 or 17s. 6d.

This volume contains trade statistics in food and agricultural commodities for 1951 and the latest revised data for 1948, 1949 and 1950 compared with the pre-war (1934-38) average.

4744. GEISENHEIM (STEINBERG, J.).

Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau, Geisenheim am Rhein. Bericht für die Rechnungsjahre 1946-1951. (Report for the years 1946-51 of the Geisenheim Horticultural College and Research Station), [1953?], pp. 96, bibl. numerous.

The glasshouses and other buildings of the Research Station were badly damaged towards the end of the war, but their reconstruction is now completed. Following an account of the College's teaching activity, separate

reports of work in progress, but not as yet of results, are given by the 13 departments and sections of the Research Station, with lists of publications appended.

4745. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM.

Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse, Geisenheim/Rheingau. 1. Oktober 1951–1. April 1953. (Report of the Federal Institute for Quality Research on Plant Products, Geisenheim, 1st October, 1951, to 1st April, 1953), 1953, pp. 22, bibl. 15, illus.

The institute, the first of its kind in Europe, was planned before the war and was finally established in 1951 under the directorship of Professor Schuphan. The main objects of the institute's work are defined as: (1) Scientific assessment of quality in horticultural and agricultural products or, in other words, of their food and health value, which is determined by their calorific value and vitamin content, as well as by the absence of toxic constituents, impurities, etc.; (2) study of the factors affecting quality; and (3) the practical application of these results in breeding, manuring, storage, pest control, etc. The report gives an account of the institute's layout and equipment and records the first results obtained with apple, spinach [see separate abstracts] and cereals. Work in progress on the nutritional value of leaf protein is mentioned as very promising. A bibliography lists relevant papers so far published by the staff or now in the press. Practical recommendations on how to improve quality are set out for the benefit of the producer, the trade and the consumer.

4746. HONG KONG.

Annual Report by the Director of Agriculture, Fisheries and Forestry, Hong Kong, for 1951-52, [1953?], pp. 84, \$5.

Vegetable variety trials. Fruit variety trials with litchis, citrus, bananas, papaws, wong pei, guavas and peaches.

4747. INDIA BOARD OF AGRICULTURE AND ANIMAL HUSBANDRY.

Proceedings of the eighth meeting of the Crops and Soils Wing, Bd Agric. India, Govt India Press, Simla, 1952, pp. 307, Rs. 12. or 19s.

Discussions and numerous papers are interestingly presented on the following [abbreviated] agenda: (1) Measures necessary for increased production of alternative crops for food grains, e.g. tapioca, sweet potato, etc. (2) The consistently low yields of major food crops in India and how to improve them. (3) Weed control. (4) Necessity for establishing seed testing stations in India. (5) The use of chemical fertilizers and compost. (6) The most suitable methods of extension and development work in Indian agriculture for increasing production.

4748. I.R.S.I.A., BELGIUM.

Rapport Annuel de l'Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1952. (Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1952), Brussels, 1953, pp. 173.

In this administrative report the research programmes subsidized by the Institute are summarized. These include investigations on fruit growing, the use of isotopes in agronomic research, tobacco growing in W. Flanders, medicinal plants and mushroom growing.

4749. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.

Thirty-third Report and Accounts of the Council of the N.I.A.B. for 1952, Cambridge, [1953?], pp. 44.

Variety trials with sprouts, broccoli, winter cabbage, onions, beans and field peas; brassica survey; vegetative propagation of brassicas; classification of dwarf french bean varieties.

4750. NEW SOUTH WALES.

Annual Report of the N.S.W. Department of Agriculture for 1951-1952, 1953, pp. 75, illus., 7s.

Plant Industry Division. Tobacco breeding. Hop breeding. Vegetables—breeding, variety trials, disease resistance, processing, manuring, minor element nutrition. Weed control. *Horticultural Division*. Citrus—control of moulds, control of stem-end rot in storage, rootstock research, trifoliata improvement and root growth studies, preharvest drop, hastening maturity. Passion fruit. Banana—disease and pest control, destruction by hormones, packing experiments. Pineapple—quick freezing. Pome fruits—rootstocks, fungal disease, breeding, storage, pruning. Stone, dried, berry and miscellaneous fruits and nuts—varietal and cultural trials, apricot internal breakdown and breeding, prune pre-harvest drop, olive oil extraction, sultana vine delayed bud burst, quick freezing of stone fruits and berries, grape vine affinity and fruit set tests, preserving of fruit and vegetables. *Science Services Division*. Control of diseases and pests. Trace element investigations. Residues on crops. [See also abstract 4498.]

4751. NIGERIA.

Annual Report Nigeria Agricultural Department for 1950-51, Lagos or Crown Agents for the Colonies, Millbank, Lond., 1953, pp. 123, 9d.

Western Provinces research. Cacao: propagation, selection, black pod disease (*Phytophthora palmivora*), parasites of swollen shoot disease vectors. Citrus: varieties. *Cocoa Division*. Cocoa survey, swollen shoot disease. *Oil Palm Research Station*. Nursery, seedling selection, transplanting, fertilization, burning-hole-planting, time of harvesting, and germination experiments; introduction of *Elaeis melanococca* seed. [See separate abstract on black pod disease of cacao.]

4752. OFFICE OF FOREIGN AGRICULTURAL RELATIONS (OFAR).

Foreign agricultural situation chart book. [Publ.] OFAR, U.S. Dep. Agric., 1952, pp. 61.

Maps, charts and graphs are presented showing United States and world production and trade, including fruits, fats and oils, tobacco and coffee, for various periods within the last 50 years.

4753. ROTHAMSTED (LAWES AGRICULTURAL TRUST).

Report of Rothamsted Experimental Station for 1952, Harpenden, 1953, pp. 211, 7s. 6d.

This report contains much of horticultural interest including some items which have been abstracted separately. Information will be found on: iron deficiency chlorosis induced by excess manganese, biochemical work on peas and tobacco, the chemistry of insecticides and fungicides, insecticidal residues, bees, statistical methods, etc.

4754. TUCUMÁN.

La Labor de la Estación Experimental en el Año 1952. (Annual Report of the Tucumán Agricultural Experimental Station, 1952), 1953, pp. 50, illus., being Publ. misc. Estac. exp. agric. Tucumán 6.

Sugar cane. Breeding, pathology, growth substance tests, cultural and mechanized planting trials. *Fruit growing*. Citrus stock/scion affinity trials; selection and multiplication of peach, apricot, cherry, almond, walnut, chestnut, avocado and papaw. *Horticulture and floriculture*. Selection and trials of tomato, red pepper, saffron crocus (*Crocus sativus*), asparagus and gladiolus. *Commercial crops*. Olive; tung (*Aleurites fordii*); acclimatization and propagation of pyrethrum, derris, *Cymbopogon*, *Cryptostegia*, guayule, ginger and others. *Plant pathology*. Citrus, sugar cane. *Entomology*. Citrus pests, especially *Anastrepha* spp. and *Ceratitis capitata*; sugar cane pests, especially the borer *Diatraea saccharalis*; biological control of *Pseudaulacaspis pentagona* on peach by the wasp *Prospaltella berlesii*; insecticides. *Sugar chemistry and technology*.

4755. U.S. DEPARTMENT OF AGRICULTURE (TRULINGER, R. W.).

Report on the Agricultural Experiment Stations 1952, 1953, pp. 150.

Fruits: New varieties; nutrition; control of fruit set; rootstocks; storage and handling. *Vegetables*: foliar fertilizer application; row spacing; mushroom production; irrigation; harvesting and storing; new varieties. *Ornamentals*: new varieties; liquid fertilizers; effects of 2,4-D on woody ornamentals; greenhouse soils. *Diseases*: of fruits, vegetables, and ornamentals. *Pests*: virus vectors; vegetable insects. [See separate abstracts.]

4756. U.S. DEPARTMENT OF AGRICULTURE.

Insects, being *Year book of Agriculture 1952*, Supt. Documents, Washington, D.C., 1953, 6×9½ in., pp. 780+lxvii coloured plates, \$2.50.

The horticulturist will be interested in more than a few of the articles in this massive tome, among them the following: Insecticides and bees, insects to control a weed, residues on fruits and vegetables, an agricultural Ellis Island, cold treatment of fruits, the pea weevil, the pea aphid, the beet leaf hopper, the oriental fruit fly, the Mexican fruit fly, spider mites, insects and DDT, the Japanese beetle, insect pests of flowers and shrubs. In addition, many of the coloured plates may help him. The articles and all the writing is in non-technical style

which makes for easy reading but not always for clarity, when scientific names are not provided, as is sometimes the case. Articles vary in length from 3 to 8 pages.

4757. WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Report on the work of the College for the year ended 30th September 1952, Glasgow, 1952, pp. 64.

Early outdoor *chrysanthemum* trials were continued to find varieties suitable for commercial cultivation in Scotland without protection and for outdoor cultivation with overhead protection. *Sodium cyanate* as selective weedkiller for leek and onion crops. *Tomato* trials. Tests showed that irradiation with high pressure mercury vapour lamps greatly increases growth and vigour of seedlings in winter and the best method of using the lamps is being studied. John Innes compost trials continue. *Pathology*. Diseases studied include *Botrytis* diseases, *Cladosporium* leaf mould on tomato, diseases and failures of beans, club-root, dahlia low virus.

4758. ZANZIBAR.

Annual Report of the Zanzibar Department of Agriculture, 1951, and *Supplement*, being Results of field experiments, crop and stock records and other statistics, 1953, pp. 30, sh. 2, and 1953, pp. 15, sh. 1.50, respectively.

Mention is made in the report of the following work: *Cloves*. For the control of die-back (*Cryptosporella* sp.) a technique is being developed for cutting out diseased tissue and painting the wounds. Experiments are in progress to determine whether sudden death is caused by the fungus *Valsa* sp. *Coconuts*. Entomological and control studies are being made on *Theraptus* sp., the insect causing gumming disease. *Cacao*. Coco-yams appeared to provide the best shelter for newly established trees. Damage caused by *Theraptus* sp. was observed for the first time on cocoa pods. *Derris*. In preliminary trials the proprietary growth substance Seradix greatly increased the percentage of "take" in direct field planting.

In the supplement crop records are given of citrus, oil palms, cacao, coffee, chillies and European vegetables.

New or revived periodicals.

4759. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA.

Australian Journal of Botany [Aust. J. Bot.], 1953, Vol. 1, No. 1, pp. 184, illus., C.S.I.R.O., 314 Albert Street, East Melbourne, C.2, Victoria, 7s. 6d. per issue.

The foreword to this journal defines it as a medium for the publication of results of original scientific research in botany with special emphasis on descriptive aspects. Publication will be at irregular intervals as the accumulation of suitable material dictates. In form and in quality of production it is of the same high standard as that associated with other journals published by C.S.I.R.O.

4760. F.A.O.

Plant protection bulletin [FAO Plant Prot. Bull.], Rome, 1953, Vol. 1, No. 10, pp. 145-60, in English, French and Spanish, \$3.00 or 15s. a year.

This attractively produced journal in its English, French and Spanish edition has now been running for nearly a year and looks like being a worthy successor to its forerunner, The International Bulletin of Plant Protection.* A note is given on this earlier periodical in Vol. 1, No. 8, p. 123, and tribute is justly paid to the part played by its editor in international plant protection. Points not made in that note, but surely worth making, are that the whole idea of the earlier journal originated with its editor, Dr. G. Trinchieri, and that the International Institute of Agriculture, in first publishing the International Bulletin of Plant Protection, brought his idea to fruition and thus well and truly laid the foundations of the present journal.

4761. SCIENTIFIC RESEARCH INSTITUTIONS OF SOIL SCIENCE AND AGRICULTURAL CHEMISTRY OF YUGOSLAVIA.

Zemljiste i Biljka (Soil and Plant) [Zemlj. Bilj.], 1952, Vol. 1, No. 1, pp. 180, illus.

The English sub-title of this new publication, to appear three times a year, is *Journal of Soil Science, Plant Nutrition, Soil Microbiology and Fertilizers*. The first number contains two papers of horticultural interest, i.e. on the use of hormones in vegetative propagation of vine and on the effects of copper and brown coal on nicotine and citric acid contents of *Nicotiana rustica*. The articles, which are in Yugoslavian, are printed in Roman letters and are all provided with either English, French or German summaries. In addition, summaries of articles from Yugoslav and foreign journals are given, and a number of translated abstracts from *Soils and Fertilizers* are included.

4762. SOUTH INDIAN HORTICULTURAL ASSOCIATION.

South Indian Horticulture [S. Indian Hort.], 1953, Vol. 1, No. 1, pp. 32, illus., Rs. 5 in India and Rs. 6 abroad.

The South Indian Horticultural Association was formed in 1952 with the main aim of publishing a horticultural miscellany and has now issued the first number of its illustrated quarterly, *South Indian Horticulture*. The new journal will publish review articles by Coimbatore students on practical problems, as well as research and popular articles, and will contain an information column for readers' queries.

Noted.

4763.

a ADELAIDE.

A.R. Board of Governors, Botanic Garden, Adelaide, South Australia, 1950/51, 1951, pp. 16, illus.

b EAST AFRICA HIGH COMMISSION.

Annual Report East African Agriculture and Forestry Research Organization, 1952, 1953, pp. 101.
See abstract 4400 (pyrethrum) and 1590 (cloves).

* Issued 1927-1946 in English, French, German, Italian and Spanish.

- c EDINBURGH.
Report of the Edinburgh and East of Scotland College of Agriculture for the year ending 30th September 1952, pp. 140.
- d EUROPEAN PLANT PROTECTION ORGANISATION (E.P.P.O.).
Progress report of the European Plant Protection Organisation, 1952, Paris, 1953, pp. 25 [French and English].
- e FAO.
Report of the Council of FAO, 17th Session, 15-24 June 1953, pp. 64 [in English, French and Spanish].
- f GEORGIA.
Serving Georgia through Research, being *Annual Report of the University of Georgia College of Agriculture Experiment Station, 1951/52*, 1952, pp. 36.
Consists mainly of lists of projects and publications.
- g NORTHERN RHODESIA.
A.R. Northern Rhodesia Dep. Agric. for 1952, Lusaka, 1953, pp. 27, 1s.
Includes statistics of tobacco production.
- h SECRETARY OF AGRICULTURE, U.S.A.
Report of the Secretary of Agriculture, 1952, U.S. Govt Printing Office, Washington, 1952, pp. 43, 20 cents.
- i WELLESBOURNE.
3rd Annual Report of the National Vegetable Research Station, Wellesbourne, Warwick, 1952 [Oct. 1951-Sept. 1952], 1953, pp. 50.
See separate articles.
- j WISCONSIN.
What's new in farm science? being *Part I of the 67th and 68th Annual Report of the Wisconsin Agricultural Experiment Station 1949/50 and 1950/51*, 1952, pp. 111, bibl. pp. 12½, issued as *Bull. 496*.